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The effect of ultrasound-guided rectus sheath block on postoperative analgesia in robot assisted prostatectomy

A randomized controlled trial

Sami Kaan Coşarcan, MD[a,b,*], Yavuz Gürkan, MD[c], Mete Manici, MD[c], İrem Özdemir, MD[d], Mert Kılıç, MD[e], Tarık Esen, MD[e,f], Ömür Erçelen, MD[d,g]

Abstract

Background: Postoperative pain continues to represent an important problem even after minimally invasive robotic-assisted laparoscopic radical prostatectomy, which results in discomfort in the postoperative period and sometimes prolongs hospital stays. Regional anesthesia and analgesia techniques are used in addition to systemic analgesics with the multimodal approach in postoperative pain management. Ultrasound-guided fascial plane blocks are becoming increasingly important, especially in minimally invasive surgeries. Another important cause of discomfort is urinary catheter pain. The present randomized controlled study investigated the effect of rectus sheath block on postoperative pain and catheter-related bladder discomfort in robotic prostatectomy operations.

Methods: This randomized controlled trial was conducted from March to August 2022. Written informed consent was obtained from all participants. Approval for the study was granted by the Clinical Research Ethics Committee. All individuals provided written informed consent, and adults with American Society of Anesthesiologists Physical Condition classification I to III planned for robotic prostatectomy operations under general anesthesia were enrolled. Following computer-assisted randomization, patients were divided into 2 groups, and general anesthesia was induced in all cases. Rectus sheath block was performed under general anesthesia and at the end of the surgery. No fascial plane block was applied to the patients in the non-rectus sheath block (RSB) group.

Postoperative pain and urinary catheter pain were assessed using a numerical rating scale. Fentanyl was planned as rescue analgesia in the recovery room. In case of numerical rating scale scores of 4 or more, patients were given 50 μg fentanyl IV, repeated if necessary. The total fentanyl dose administered was recorded in the recovery room. IV morphine patient-controlled analgesia was planned for all patients. All patients' pain (postoperative pain at surgical site and urethral catheter discomfort) scores and total morphine consumption in the recovery unit and during follow-ups on the ward (3, 6, 12, and 24 hours) in the postoperative period were recorded.

Results: Sixty-one patients were evaluated. Total tramadol consumption during follow-up on the ward was significantly higher in the non-RSB group. Fentanyl consumption in the postanesthesia care unit was significantly higher in the non-RSB group. Total morphine consumption was significantly lower in the RSB group at 0 to 12 hours and 12 to 24 hours. Total opioid consumption was 8.81 mg in the RSB group and 19.87 mg in the non-RSB group. A statistically significant decrease in urethral catheter pain was noted in the RSB group at all time points.

Conclusion: RSB exhibits effective analgesia by significantly reducing postoperative opioid consumption in robotic prostatectomy operations.

Abbreviations: CRBD = catheter-related bladder discomfort, iv = intravenous, MCID = minimum clinically important difference, NRS = numeric rating scale, PASS = patient acceptable symptom state, PONV = postoperative nausea and vomiting, RARP = robot assisted-radical prostatectomy, RSB = rectus sheath block, SD = standard deviation, TAP = transversus abdominis plane block.

Keywords: catheter-related bladder discomfort, fascial plane blocks, postoperative analgesia, regional anesthesia, robotic prostatectomy

Consent obtained from patients.

The authors have no funding and conflicts of interest to disclose.

The data that support the findings of this study are available from a third party, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available.

The study was approved by the Koç University Clinical Research Ethics Committee (2022.025.IRB1.020) in February, 2022. This study involves human participants. Participants gave informed consent to participate in the study before taking part.

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[a] Department of Anesthesiology, VKV American Hospital, Istanbul, Turkey, [b] Department of Anesthesiology and Reanimation, Koç University, School of Medicine, Istanbul, Turkey, [c] Department of Anesthesiology and Reanimation, Koç University Hospital, School of Medicine, Istanbul, Turkey, [d] Department of Anesthesiology and Algology Clinic, Koç University Hospital, School of Medicine, Istanbul, Turkey, [e] Department of Urology, VKV American Hospital, Istanbul, Turkey, [f] Department of Urology, Koç University Hospital, School of Medicine, Istanbul, Turkey, [g] Department of Anesthesiology and Algology Clinic, VKV American Hospital, Istanbul, Turkey.

** Correspondence: Sami Kaan Coşarcan, Department of Anesthesiology and Pain, VKV American Hospital, Istanbul 34365, Turkey (e-mail: skcosarcan@gmail.com).*

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Key points

- Postoperative pain continues to represent an important problem after robotic prostatectomy, which results in discomfort in the acute period.
- Another important cause of discomfort is urinary catheter pain in robotic prostatectomy.
- The rectus sheath block provides effective postoperative analgesia in robotic prostatectomy.
- A rectus sheath block may be effective in the treatment of catheter-related bladder discomfort after robotic prostatectomy.

1. Introduction

Prostate cancer is one of the most common cancers in the world and constitutes 15% of all cancers in men.[1] Radical prostatectomy being a major treatment option is performed much more commonly in robot-assisted laparascopic (RARP) fashion than open radical retropubic prostatectomy[2,3] and thus is associated with a shorter hospital stay, decreased postoperative analgesic requirements, lower blood transfusion risks and fewer of less than 1 month compared to open surgery.[4,5]

Moderate postoperative pain continues to represent an important problem even after minimally invasive RARP resulting in discomfort in the postoperative period and sometimes prolonged hospital stays.[6] Optimal pain management is well known to affect postoperative recovery and a multimodal approach to pain management should be adopted in minimally invasive surgeries.[7]

Regional anesthesia and analgesic techniques are used in addition to medical treatment in the multimodal approach in postoperative pain management. Fascial plane blocks are becoming increasingly important, especially in minimally invasive surgeries.[7–9] Another important cause of discomfort is the urinary catheter pain. Although various studies have investigated catheter-related bladder discomfort (CRBD), no consensus has been achieved concerning the mechanisms involved and its prevention. Martinschek et al[10] found that suprapubic catheters were less uncomfortable for patients than urinary catheters.

We hypothesized that rectus sheath block (RSB) would reduce postoperative total opioid consumption by 50% and provide better postoperative analgesia in RARP. The present randomized controlled study's primary outcome was to investigate the postoperative analgesic effect of RSB in RARP surgeries. The secondary outcome was to explore its role in the treatment of CRBD.

2. Methods

This randomized controlled trial was conducted in the American Hospital and Koç University Hospital of Istanbul, Turkey, from March to August 2022. Approval for the study was granted by the Koc University Clinical Research Ethics Committee (2022.025.IRB1.020) in February 2022. The research was submitted to ClinicalTrials.gov (NCT05242198) on February 16, 2022. Patient enrollment commenced on March 15. The actual primary completion date was August 30, and the study completion date was September 21. Written informed consent was obtained from all participants.

Adults (over 18 years of age) with American Society of Anesthesiologists Physical Condition classification I to III planned for RARP under general anesthesia were enrolled. Patients with bronchopulmonary disease, known long-term opioid use, contraindication to nerve blocks (infection, bleeding diathesis, or allergy to local anesthetics), or a history of significant psychiatric conditions capable of affecting patient assessment were excluded.

Postoperative pain and urinary catheter pain were assessed using a numerical rating scale (NRS) (from 0 [no pain] to 10 [worst possible pain]). Fentanyl was planned as rescue analgesia in the recovery room. In case of NRS scores of 4 or more, patients were given 50 µg fentanyl IV, repeated if necessary. The total fentanyl dose administered was recorded in the recovery room. Intravenous morphine patient-controlled analgesia was planned for all patients (1 mg bolus dose—10 min lock-out only). Four milligrams of dexamethasone were administered intravenous (iv) to all patients, who also received 800 mg ibuprofen and 1 g paracetamol iv as part of multimodal analgesia. Postoperative analgesia consisted of 1 g oral paracetamol every 6 hours and 800 mg iv ibuprofen twice daily for 48 hours after surgery. All patients' pain (postoperative pain at surgical site and urethral catheter discomfort) scores and total morphine consumption in the recovery unit and during follow-ups on the ward (3, 6, 12, and 24 hours) in the postoperative period were recorded by the acute pain team.

2.1. General anesthesia

Following computer-assisted randomization, general anesthesia was induced in all cases using a standardized protocol consisting of intravenously administered propofol 2 mg kg^{-1}, fentanyl 1 µg kg^{-1}, and rocuronium 0.6 mg kg^{-1} and was maintained with 1 minimum alveolar concentration of desflurane and remifentanil infusion (0.05–0.20 µg/kg per min). The remifentanil infusion was adjusted based on the patient's heart rate and blood pressure. Anesthesia depth was monitored using a bispectral index (BIS) monitor, the desflurane level being adjusted to yield BIS values between 40 and 60. A radial artery cannula was placed under ultrasound for invasive blood pressure monitoring. At the end of surgery, rocuronium was antagonized with iv sugammadex 2 mg kg^{-1}. Ondansetron 4 mg iv was administered to prevent postoperative nausea and vomiting (PONV).

2.2. Surgical technique

All patients were operated on by the same surgery team and all surgeries were performed using the transperitoneal approach, utilizing the da Vinci Surgical System (Intuitive Surgica, Sunnyvale, CA). Lymph node (LN) dissection (LND) was performed if the calculated risk of LN involvement was over 7% in the Briganti 2017 nomogram. At the end of the operation, all patients received a 20 Fr two-way Foley urinary catheter, and a pelvic drain.

2.3. Rectus sheath block procedure

RSB was performed under general anesthesia and at the end of surgery. The linear array ultrasound transducer (GE Logiq P9 4–12 MHz, Korea) was placed in a transverse orientation just above the umbilicus, 1 cm lateral to the midline. The rectus abdominis muscle and posterior rectus sheath were then identified. The needle (SonoBlock, 22G 80 mm Facet S tip Pajunk, Germany) was placed on the lateral border of the transducer and advanced from lateral to medial. It was then inserted in-plane through the rectus abdominis muscle until the tip reached the space between the muscle and posterior rectus sheath. Next, 20 mL of local anesthetic (0.25% bupivacaine) was injected after correct fascial plane spread had been observed using the hydrodissection method with 1 mL of sterile saline (Fig. 1A and B). These steps were then repeated on the contralateral side. All blocks were performed by SKC and YG, both with extensive regional anesthesia experience.

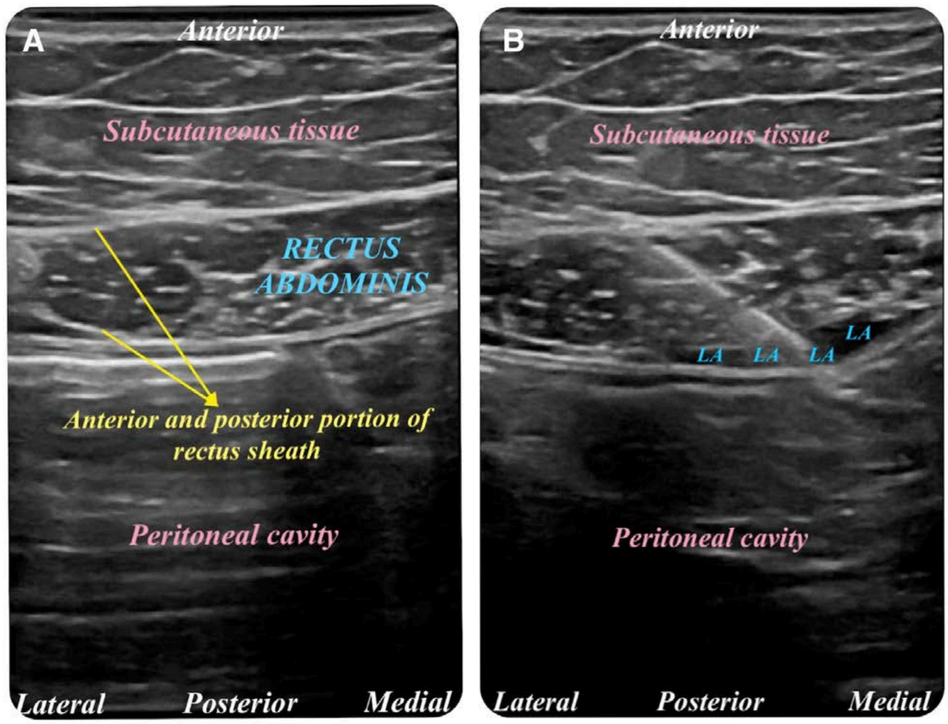

Figure 1. (A and B) Needle placement and local anesthetic spread in ultrasound-guided rectus sheath block ([A] needle placement of rectus sheath block, [B] local anesthetic spread under the rectus abdominis muscle).

2.4. Postoperative recovery unit monitoring

All patients' pain scores were recorded on arrival at the postoperative recovery unit and after 60 minutes by pain nurses blinded to the group allocations. For the nurses not to understand whether the rectus sheath block was applied to the patients, they were defined as groups A and B in the pain follow-up forms. Patients with NRS scores of 4 or more received 50 mcg fentanyl IV. Total fentanyl doses administered in the postoperative recovery unit and PONV were recorded. If PONV was present, ondansetron HCL (Zofer, 8 mg/4 mL, Adeka İlac, Turkiye) 4 mg iv was planned. Hyoscine n-butylbromide (Spazmol 20 mg mL^{-1}, Deva İlaç, Turkiye) 20 mg iv was planned in case of patients with urethral pain scores (catheter-NRS) of 4 or above.

2.5. Surgical ward follow-up

The same multimodal analgesia regimen was applied to all patients. In case of NRS of 4 or above, 1 mg/kg IV tramadol was planned as rescue analgesic. Potential side-effects developing due to opioid consumption (PONV), itching, and respiratory depression were also recorded. Hyoscine n-butylbromide 20 mg iv was planned in case of patients with urethral catheter discomfort scores (catheter-NRS) of 4 or more. All follow-ups were recorded by ward and pain nurses. Medication orders were given by doctors according to pain scores.

2.6. Statistical analysis

The study data were analyzed using IBM SPSS Statistics for Windows, version 20.0 software. Data were summarized as mean ± standard deviation (SD) and median-range for continuous variables, and frequencies and percentiles for categorical variables. Student t and the Mann–Whitney U tests were used for independent group (RSB vs non-RSB) comparisons, depending on the distributional properties of the data by groups (evaluated using the Shapiro–Wilk test). The Chi-square test was used for proportions and its counterpart, Fisher Exact test, when the data were sparse. The differences between the 2 groups at the 5 time points and the interaction of these 2 main effects were tested using two-way repeated measures ANOVA. The sphericity assumption was validated using Mauchly test sphericity. Since this assumption was found to be violated, Wilk Lambda statistic was used for multivariate test results, with mean ± SD values being employed as descriptive statistics. Any P value <.05 was considered statistically significant for all analyses.

2.7. Sample size calculation

The sample size required for the study was calculated based on the primary outcome variable, postoperative opioid consumption. In the preliminary study, which we conducted with 10 cases per group, 48-hour morphine consumption was 7.8 mg in the RSB group, and 18.7 mg in the non-RSB group. Based on the preliminary study, RSB reduced 48-hour total morphine consumption by 50% or more. Total iv opioid consumption used in 10 patients was also controlled on the basis of morphine equivalents, with 10 mg of tramadol and 10 µg of fentanyl iv being considered equivalent to 1 mg of morphine. Group sample sizes of 27 and 27 achieved minimum 80% power for detecting a difference of 50% in postoperative morphine consumption between the RSB and non-RSB groups at a 5% significance level (alpha) using a two-sided Mann–Whitney test, assuming that the actual distribution was non-normal.

3. Results

Group sample sizes were established with a minimum 80% power for detecting a difference of 50% in postoperative morphine consumption between the RSB and non-RSB groups.

Considering the potential drop-out rate, we planned to include 32 patients in both groups. Following computer-assisted randomization, 3 patients were excluded during the study procedures when data collection had been completed (pain scores were missing for 2 patients, and protocol violation occurred in another case because the morphine patient-controlled analgesia lock-out time was set to 7 minutes). Sixty-one patients were thus finally included in the study (Fig. 2). No difference was observed between the groups in terms of demographic data, duration of surgery, American Society of Anesthesiologists Physical Status score distributions, LND rates and prostate volume as shown in Table 1. The preoperative urological evaluation showed that, 2 (6%) patients in the first group and 3 (10%) patients in the second group had severe LUTS (IPSS score > 19), and the mean IPSS score was similar in both groups (P = .295).

A significant difference was observed in opioid consumption at all postoperative periods (Table 2). Total tramadol consumption during follow-up on the ward and fentanyl consumption in the post-anesthesia care unit were both significantly higher in the non-RSB group. Total morphine consumption was significantly lower in the RSB group at 0 to 12 hours and 12 to 24 hours. The decreases in morphine requirements in the RSB group were 55% in the first 12 hours and 60% in the second 12-hour period. When the total tramadol to morphine requirements and morphine requirements were combined, the total morphine-sparing dose in the RSB group was 21.26 mg, with a 71% reduction. Moreover, a decrease in opioids of at least 50% was observed at each time point in the RSB group.

Total morphine consumption was significantly lower in the RSB group at 0 to 12 hours and 12 to 24 hours. Resting pain scores (r-NRS) and coughing pain scores (a-NRS) are shown in Table 3. A statistically significant decrease was observed in both parameters in the RSB group. Post hoc analyses within the RSB group for NRS scores revealed no significant difference between the 6-, 12-, and 24-hours time points. However, a significant decrease was observed between all-time points in the non-RSB group. Multiple post hoc analyses within the RSB group revealed no statistical significance in pain scores between 6 hours and 12 and 24 hours postoperatively. However, statistical significance was determined at all time points in the non-RSB group.

A comparison of urethral catheter pain between the 2 groups is shown in Table 3 and Figure 3. A statistically significant decrease was noted at all time points in the RSB group.

PONV and hyoscine n-butylbromide requirements in the first 24 hours postoperatively are shown in Table 4. A statistically significant difference was observed between the groups in terms of PONV and hyoscine n-butylbromide use (P .001 and <.001, respectively). In terms of patients with CRBD, the use of hyoscine n-butylbromide was significantly higher than in the non-RSB group in line with higher catheter pain scores.

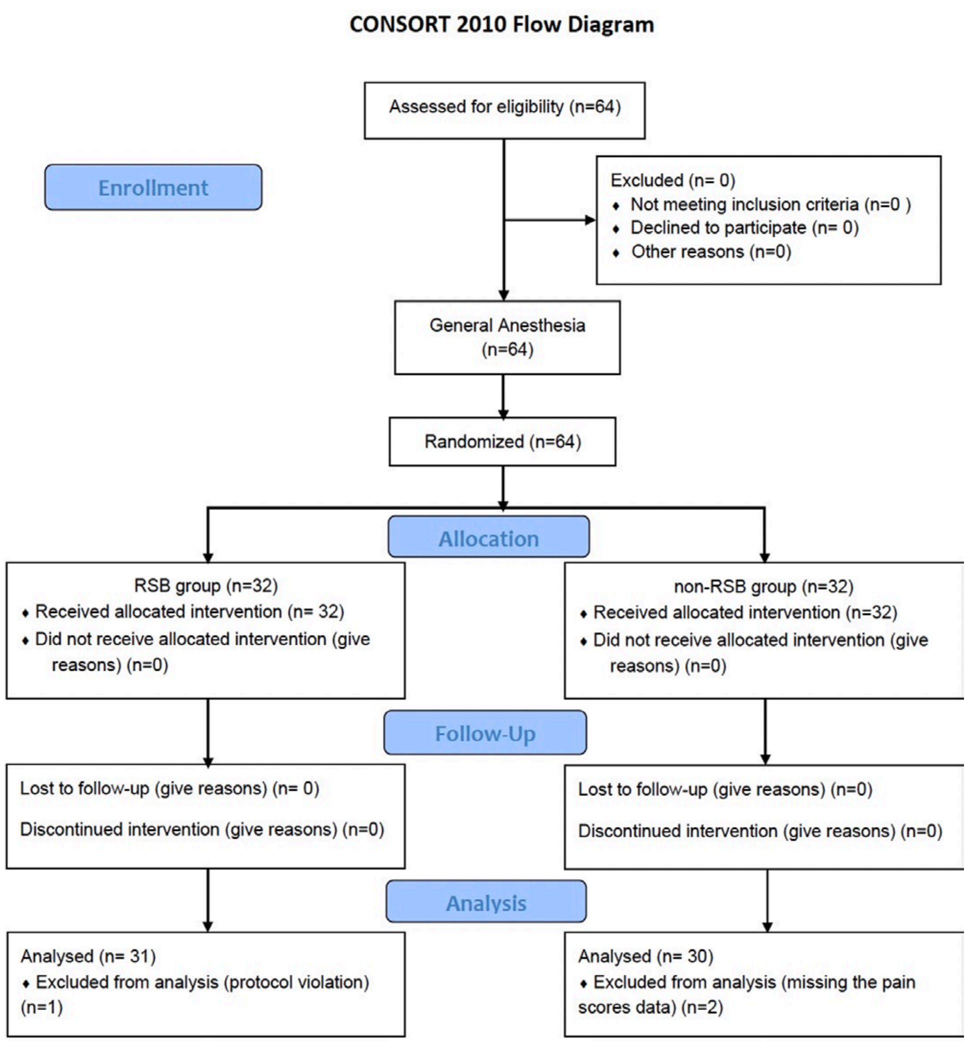

Figure 2. Patient flowchart.

Table 1

Comparisons of preoperative and intraoperative characteristics between the RSB and non-RSB groups [mean ± SD and median-range].

	RSB		non-RSB		P
Age (years)	62.52 ± 8.08	61–32	63 ± 5.61	63–28	.782
Height (cm)	176 ± 4.5	176–18	175 ± 4.52	173–17	.307
Weight (kg)	89.42 ± 8.34	89–42	86.87 ± 9.18	80.5–46	.193
BMI (kg m^{-2})	28.89 ± 2.75	28.7–14.2	28.12 ± 2.41	27.1–23.7	.503
Duration of surgery (minutes)	215 ± 32.99	200–135	215.03 ± 36.81	212.5–145	.659
Prostate volume (mL)	46.5 ± 18.5		48.4 ± 20.2		.390
Lymph node dissection (%)	63.37 ± 1.24		64.55 ± 1.54		.642
ASA (I/II/III) (number)	5/17/9		5/20/5		.547

ASA = American Society of Anesthesiologists Physical Status.

Table 2

A comparison of postoperative total opioid consumption between the RSB and non-RSB groups [mean ± SD and median-range].

	RSB		Non-RSB		P
PACU-fentanyl (µg)	33.87 ± 35.09	50–100	105 ± 30.37	100–100	<.001
Total tramadol (mg)	0 ± 0	0–0	102.17 ± 91.93	100–300	<.001
Total morphine (mg)	8.81 ± 2.74	9–10	19.87 ± 3.85	19–17	<.001
Morphine (0–12 hours)	7.45 ± 2.38	7–9	16.6 ± 3.41	16–16	<.001
Morphine (12–24 hour)	1.35 ± 0.95	1–3	3.27 ± 1.84	3–8	<.001

PACU = postoperative care unit.

Table 3

A comparison of postoperative 0–24-hour resting/activity and catheter-related pain NRS values between the groups [mean ± SD].

	RSB	Non-RSB	P
rNRS PACU 60’	1.94 ± 0.73	4.3 ± 0.95	
rNRS 3 hours	0.84 ± 0.9	3.1 ± 0.96	
rNRS 6 hours	0.23 ± 0.56	1.93 ± 1.26	<.001
rNRS 12 hours	0.03 ± 0.18	0.6 ± 1.1	
rNRS 24 hours	0.00 ± 0.00	0.2 ± 0.61	
aNRS PACU 60’	2.84 ± 0.73	5.87 ± 1.14	
aNRS 3 hours	2.1 ± 0.87	4.47 ± 1.14	
aNRS 6 hours	0.81 ± 1.01	3.17 ± 1.37	<.001
aNRS 12 hours	0.13 ± 0.43	1.13 ± 1.53	
aNRS 24 hours	0 ± 0	0.17 ± 0.65	
Cath NRS PACU 60’	0.42 ± 0.89	3.33 ± 1.75	
Cath NRS 3 hours	0.06 ± 0.36	2.77 ± 1.5	
Cath NRS 6 hours	0.03 ± 0.18	1.57 ± 1.57	<.001
Cath NRS 12 hours	0 ± 0	0.27 ± 0.91	
Cath NRS 24 hours	0 ± 0	0 ± 0	
p2 < 0.001			p3 < 0.001

p: comparison for time; p2: for groups and p3: for interaction term. Mean ± SD.
aNRS = activity numerical rating scale, Cath NRS = catheter numerical rating scale, PACU = postoperative anesthesia care unit, rNRS = resting numerical rating scale.

4. Discussion

This study showed that RSB in RARP yields lower pain scores and lower opioid consumption for 24 hours, particularly in the first 6 hours postoperatively. It also exerts a statistically significant effect on urethral catheter pain.

There are various causes of pain associated with robotic surgery, including incisional port area pain, peritoneal pain caused by carbon dioxide insufflation, visceral pain, and referred pain. Rapid insufflation of the peritoneum with carbon dioxide causes traumatic nerve traction and the release of inflammatory mediators.[11] It also causes shoulder, back, and upper abdominal pain through stretching of the diaphragm and irritation of the phrenic nerve. If postoperative pain is not effectively treated, some of the most important benefits of minimally invasive surgery may not be achieved, and side-effects may occur due to the use of opioid analgesics.[11–14] Various analgesic methods are used for RARP, the main steps consisting of regional analgesia techniques and opioid and non-opioid analgesics.[13,14] As in all robotic and laparoscopic surgeries, multimodal analgesia methods are recommended.[12,15] The PROSPECT guideline recommends reducing and limiting opioid consumption in prostatectomy operations[7,15] describing the use of non-opioid agents such as paracetamol and fascial plane blocks, especially the transversus abdominis plane block (TAP) block, as effective and recommended.[7,15] Fascial plane blocks are regional anesthetic techniques that target the space between 2 layers of fascia rather than a specific nerve or plexus. The differences in somatic and visceral innervation of the abdomen should be considered when planning fascial plane blocks.[16,17] Chiancone et al[18] conducted a randomized study of TAP blocks in RARP and reported effective analgesia for 72 hours postoperatively. Rogers et al[19] found that TAP blocks were effective for 24 hours postoperatively following RARP, with lower pain scores and fewer additional analgesic requirements. Shim J et al[20] investigated the effectiveness of RSB in RARP in a non-randomized observational study, and reported significantly lower resting and cough pain scores at 6 hours postoperatively and resting pain scores at 24 hours postoperatively. Pain mechanisms after laparoscopic prostatectomy include not only somatic nerves but also sympathetic, parasympathetic and phrenic nerves. Facial plan blocks may show different results in this respect rendering perception of discomfort and/or pain for an individual patient essential. Our results were consistent with those in the previous literature. A decrease of at least 50% in opioid consumption was observed at all time points in the RSB group (less than at the other time points at 12 and 24 hours). This can be interpreted as indicating the analgesic efficacy of the RSB especially for the first 6 hours postoperatively. This is the first randomized controlled trial investigating the effect of RSB on postoperative analgesic use following RARP. We think that further randomized controlled studies comparing RSB and TAP block in RARP will make important contributions to the existing literature attempting to answer the question which represents the gold standard analgesia method.

CRBD occurs in a high proportion of patients following RARP. Stamm et al[21] reported no association between pain and catheter size in their randomized controlled study. The mechanism involved in CRBD are mediated by muscarinic receptors.[22,23] No patient in our study had high IPSS scores (with special emphasis to storage domains), very large prostates (>100 gr) or big middle lobes necessitating substantial bladder neck

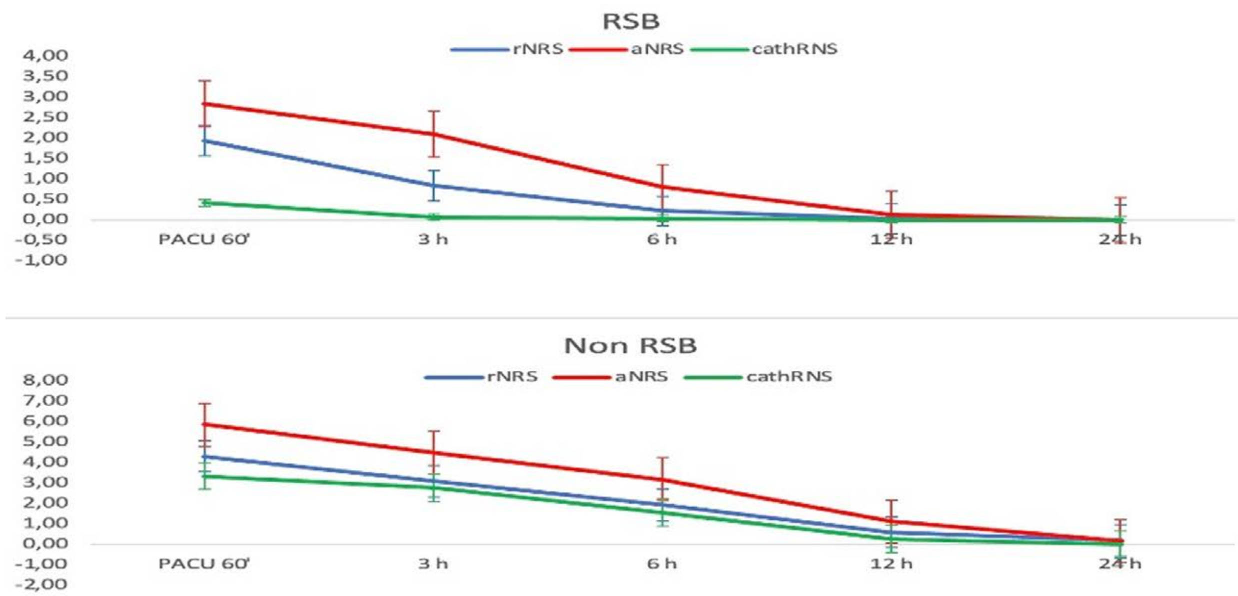

Figure 3. A comparison of postoperative 0–24-hour resting and activity (cough) pain and urethral catheter pain values between the groups.

Table 4

The presence of PONV and hyoscine n-butylbromide requirements in the postoperative first 24 hours.

		RSB		Non-RSB		
		n	%	n	%	P
PONV	0	31	100.00	21	70.00	.001
	1	0	0.00	9	30.00	
Hyoscine n-butylbromide	0	27	87.10	11	36.67	<.001
	1	4	12.90	19	63.33	

For PONV; 0: number of patients without PONV, 1: number of patients with PONV.
For hyoscine n-butylbromide; 0: number of patients not using hyoscine n-butylbromide, 1: number of patients using hyoscine n-butylbromide.

reconstructions. Nevertheless, CRBD remains a complex and multifactorial issue. Agents such as dexmedetomidine, ketamine, pregabalin, and tramadol, and intravesical local anesthetic methods are frequently employed.[22,24] However, the risk and benefits are also still unclear.[24] The present study also examined urethral catheter-related pain, and the results show a statistically significant decrease in urethral catheter pain scores at all time points in the RSB group. Significantly lower hyoscine n-butylbromide use was also observed in the RSB group, although this was a secondary outcome. This is a difficult phenomenon to understand. The analgesic efficacy of RSB is incompatible with the pathophysiology and dermatomal distribution of potential urethral catheter-related pain. We hypothesize that rectus abdominis muscle relaxation is most likely to occur following RSB preventing bladder spasms. Furthermore, local anesthetic injected into the posterior aspect of the rectus muscle near the umbilicus during a rectus sheath block may leak from the posterior aspect of the rectus sheath into the peritoneum, make its way to the pelvis (gravity assisted) and accumulate close to the neck of the bladder (surgical site) providing analgesia.

Pain is both subjective and multidimensional, and therefore the VAS (and NRS) may not capture the full experience of pain.[25] Miles et al[25] addressed this issue about the minimum clinically important difference (MCID). Different scales related to the emotional changes of pain, such as patient-reported outcome, MCID, Global Assessment Rating scale, minimal clinically important improvement, patient acceptable symptom state (PASS) are also presented.[26] These studies aim to investigate clinical concordance with VAS-NRS scores. In contrast to minimal clinically important improvement/SCB and MCID, the PASS is an absolute value in the acute pain setting, often noted in the range of 30 to 40 out of 100mm of a VAS pain scale (i.e., mild pain range). Because PASS is an absolute value ("yes" or "no" answer), not a change from baseline, and is well validated in chronic pain studies, it can be a clinically relevant treatment target to be used in the acute postoperative pain setting.[26] However, NRS scoring is still valid and scientifically valuable for pain studies.

5. Limitations

There are several limitations to this study. First, no sensory evaluation was conducted because the RSB was performed at the end of the operation with the patient under general anesthesia. In addition, CRBD detection and grading are unclassified parameters. We evaluated the NRS separately for urinary catheter pain risking that patients may confuse this with postoperative pain. Further limitations include the relatively short duration of the pain assessment, the fact that effect of RSB on chronic incision pain was not studied, and that no functional assessment (walking or time to discharge) was conducted. The contribution of RSB to enhanced recovery after surgery was also not examined. Finally, no comparison was performed with a regional analgesia method with proven analgesic efficacy or with a group that received iv lidocaine infusion.

6. Conclusion

RSB exhibits effective analgesia by significantly reducing postoperative opioid consumption in robot assisted radical prostatectomy operations. It also appears to be effective in reducing CRBD. Further studies are needed to clearly establish the role of RSB first to further minimize the need for postoperative opiod-based pain control and second to decrease the CRBD not only in robot assisted radical prostatectomy but also in prostate adenomectomy.

Author contributions

Conceptualization: Sami Kaan Coşarcan, Yavuz Gürkan, Mete Manici, İrem Özdemir, Mert Kılıç, Ömür Erçelen.
Data curation: Sami Kaan Coşarcan.
Formal analysis: Sami Kaan Coşarcan, Yavuz Gürkan.

Investigation: Sami Kaan Coşarcan, Yavuz Gürkan, Mete Manici, İrem Özdemir, Mert Kılıç.
Methodology: Sami Kaan Coşarcan.
Project administration: Sami Kaan Coşarcan.
Resources: Sami Kaan Coşarcan.
Supervision: Sami Kaan Coşarcan, Yavuz Gürkan, Tarık Esen, Ömür Erçelen.
Visualization: Sami Kaan Coşarcan.
Writing – original draft: Sami Kaan Coşarcan.
Writing – review & editing: Yavuz Gürkan, Tarık Esen, Ömür Erçelen.

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