Original Article

The Analgesic Effect of Bilateral Quadratus Lumborum Block and its Postoperative Implication On Kidney Function in Colorectal Surgery: A Comparative Randomized Control Trial Study With Epidural Anesthesia

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Abstract

Background: Pain management in major abdominal surgery is an essential clinical task. Epidural analgesia alternatives have become popular; for instance, the quadratus lumborum (QL) block. Acute kidney injury (AKI) is one of the main complications encountered during major surgery. We aimed to assess the postoperative analgesic efficacy of the QL block compared to epidural analgesia as well as the effect on the postoperative kidney functions.

Materials and Methods: A total of 60 patients who underwent colorectal surgery with the American Society of Anesthesiologists (ASA) I–III were included and randomized into 2 groups; the study group received QL block (QL group), whereas the control group received epidural analgesia (EP group). Postoperative analgesia was assessed using a 10-point visual analog scale (VAS), time to first morphine requirement, and 24-hour morphine consumption. Postoperative renal function was compared with preoperative values using laboratory and renal Doppler indices.

Results: The age range was 35 to 65 years with 41 male patients, showing no significant difference between the two groups (P-value = 0.796 for age and 0.781 for sex). There was no significant difference between the QL block and the epidural analgesia regarding postoperative VAS pain score (P-value ranging from 0.066 to 0.869). The morphine analgesia parameters were statistically insignificant between the two groups. Nineteen patients required morphine among the QL group compared to 15 patients among the EP (P-value = 0.297), the mean cumulative dose was almost similar in both groups 3.1±1.2 mg (P-value = 0.973), and first-time use of morphine was 9.5±7.3 hours in the QL group compared to 5.9±6.0 hours in the EP group (P-value = 0.132). There was no significant difference between the 2 groups regarding blood urea nitrogen (BUN) and serum creatinine. However, QL showed significantly lower postoperative values in the renal resistive index (RI) than preoperative values. The mean RI value was 0.61±0.05 preoperatively compared to 0.58±0.05 postoperatively in the QL group (P-value = <0.001) compared to 0.62±0.05 preoperatively and 0.61±0.05 postoperatively in the EP group (P-value = 0.158).

Conclusion: QL block produced comparable analgesia with epidural anesthesia and was associated with improved postoperative renal artery flow, reflecting a better kidney performance; QL block may be the choice for patients with borderline kidney function or suspected AKI.

Keywords: Quadratus lumborum, Epidural anesthesia, Acute kidney injury, Renal function, Renal resistive index flow, Renal doppler

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Introduction

Regional anesthesia is frequently used in major surgery in association with general anesthesia to ensure adequate postoperative patient analgesia and to decrease the intra- and postoperative use of systemic analgesic drugs (1). Epidural analgesia (EP) is considered the standard regional analgesic technique widely used in abdominal surgery. Nonetheless, it has some limitations, such as in colorectal surgery, where complications in muscular weakness, hemodynamic instability, and postural hypotension result in delayed patient ambulation (2).

For these limitations, peripheral nerve blocks can be considered safer with fewer complications than the central neuraxial blocks, especially with ultrasound (US) as a guide in their techniques. Also, avoiding the hemodynamic instability that may affect the postoperative kidney function can be considered an important issue in patients with risk for postoperative acute kidney injury (AKI) (3).

One of the latest techniques in regional anesthesia is the quadratus lumborum (QL) block, which is based on US-guided injection of a local anesthetic agent into the thoracolumbar fascia surrounding the QL muscle. Several different approaches were described depending on the injection sites, for example, lateral, posterior, and anterior approaches (4). According to the ASRA-ESRA Delphi consensus, there was no consensus on naming quadratus lumborum block types where posterior QL had the strongest consensus in abdominal wall analgesia with 71% (5).

After the QL block, there is evidence that the injectate spreads to the paravertebral space, where it blocks the thoracolumbar nerves and the sympathetic thoracic trunk (4). Because it produces an extensive sensory block leading to adequate postoperative analgesia besides decreasing the systemic analgesic consumption, QL block is now considered an effective regional block used in major abdominal surgery (6).

40% of the cases diagnosed as having AKI occurred as a postoperative complication. Cardiac surgery carries the highest risk for AKI (18.7%), whereas general surgery comes second (13.2%) (7-8). The risk factors of developing AKI may be general or causes related to the surgery's type and setting (9).

Fluid depletion is one of the major factors that can occur perioperatively and leads to renal hypoperfusion, with subsequent renal arteriolar changes, attempting to maintain a normal glomerular filtration rate. The sympathetic effects of the neuroendocrine hormones may lead to renal vasoconstriction, aiming to redistribute the blood to the medulla; however, it may lead to renal ischemia (10).

The renal blood flow can be assessed by a rapid bed-side noninvasive technique, using the renal Doppler resistive index (RI), which is one of the most fundamental parameters assessing renal perfusion because it reflects the degree of the vascular resistance inside the kidney vascular bed and can be used to assess the modifications and the changes that occur in the renal blood flow (11).

No previous studies so far discussed the effect of QL block on postoperative creatinine and blood ureal nitrogen (BUN) levels. While, regarding epidural analgesia, multiple articles are investigating the effect of epidural on postoperative kidney function using various indices, such as serum creatinine, BUN, sodium clearance, and urine output. The authors know that this is the first study using the RI renal flow as a comparative parameter between the QL block and EP analgesia.

This study aimed to assess the analgesic efficacy of QL block compared with epidural anesthesia as a primary outcome using the 10-point visual analog scale (VAS), time to first morphine requirement, and 24-hour morphine consumption. Also, to study the effect of both on postoperative kidney function as a secondary outcome using serum creatinine and BUN and renal flow assessment using renal Doppler.

Methods

This study was a prospective randomized comparative controlled study following CONSORT 2010 Guidelines conducted in the Department of Anesthesia, intensive care unit, and pain management in Ain Shams University hospitals. The proposal was registered in ClinicalTrials.gov (NCT04425174, June 2020)
(www.clinicaltrials.gov/ct2/show/NCT04425174)

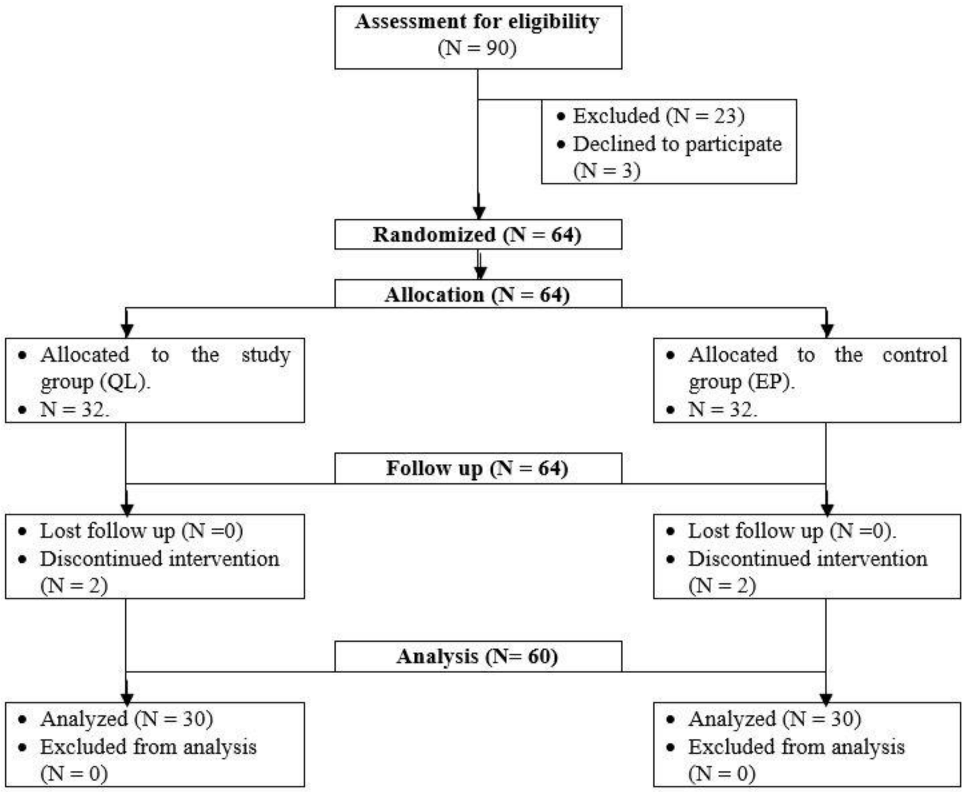

Figure 1. CONSORT Flow chart of the studied cases.

after the ethical approval of Ain Shams University (FMASU R 14/2020). Patients scheduled to perform colorectal surgery in the university hospital were enrolled in this study. Moreover, written informed consent was obtained from the patients after the ethical regulations.

Patients with an American Society of Anesthesiologists (ASA) physical status I–III, aged between 35 and 65 years, were included in this study and scheduled for short colorectal surgery (2–4 hours), such as segmental colectomies and polypectomy using either the sub umbilical incision or laparoscopic technique. Patients with major cardiac or cerebral vascular diseases, bleeding disorders (known contraindication for EP anesthesia and in QL considered a deep block), abnormal kidney functions (elevated creatinine, BUN level, or history of renal disease), and neurological disorders were excluded. Patients with known allergy to local anesthetics, puncture site infection, and body mass index (BMI) of >35 kg/m^2 were also excluded. Also, patients with intra-operative complications such as hemodynamic instability and unexpected prolonged surgical duration were excluded. Patients who refused to consent to the study were not enrolled without discontinuing their management.

The selected patients were randomized using an automated computer-assisted method (www.randomizer.org), which divided them into 2 groups: the control group (EP) received epidural anesthesia, whereas the study group (QL) received a QL block. Well-experienced anesthesiologists did the interventions.

Renal Doppler. An experienced radiologist performed the renal Doppler with at least 5 years' experience in the Doppler field being blinded to the patients' data. A renal Doppler study was performed for both groups preoperatively and postoperatively. Patients were asked to lie supine or in lateral positions. The ultrasound (US) probe was applied to the anterior or midaxillary line with the probe in a transverse direction until the kidney was adequately visualized. The intrarenal and main renal arteries were assessed using color and pulse wave Doppler. The intrarenal arteries assessment was repeated at each kidney's upper, mid, and lower pole levels. Also, the renal RI of the main renal artery was measured bilaterally. All measurements for each patient were collected, and the average RI was calculated. The normal RI is considered when the value was <0.7. The renal Doppler was assessed within 24 hours preoperative and 2–3 hours after surgery completion.

Patient preparation: Patients who fasted for 8 hours, with full clinical and laboratory results, were examined for any exclusion criteria with specific concerns concerning kidney function. Twelve hours before the scheduled time for surgery, a renal Doppler was performed to measure the renal RI of all patients before starting to fast for surgery and after adequate hydration was checked, based on his ward fluid chart.

Inside the operating room: The standard monitoring, including electrocardiogram (ECG), oxygen saturation, non-invasive blood pressure, and capnogram for end-tidal carbon dioxide ($ETCO_2$), were applied. Ringer's lactate solution (8 mL/kg) infusion was started through a wide bore cannula. IV midazolam 0.05 mg/kg was given as a premedication before the induction of anesthesia by 2 µg/kg fentanyl, 2 mg/kg propofol, and 0.5 mg/kg atracurium. An endotracheal tube was inserted to initiate mechanical ventilation while keeping the $ETCO_2$ in the 35–45 mmHg range. Anesthesia maintenance was performed with 1.5% isoflurane and oxygen and topped up with IV atracurium 0.5 mg/kg every 20 minutes. The urinary output was followed up using a urinary catheter. IV fentanyl dose of 1 µg/kg was administered in response to an increase in blood pressure or heart rate of >20% of the baseline measurement. Continuous ECG, blood pressure, and pulse saturation were monitored. To ensure an adequate fluid balance, fluid input, fluid output (urine and third space loss), blood loss, and central venous pressure were recorded. The inhalational anesthetic isoflurane was discontinued at the end of the surgery, followed by the administration of IV neostigmine of 0.05 mg/kg and atropine of 0.02 mg/kg, to reverse the residual neuromuscular block. The trachea was extubated after spontaneous breathing returned.

Epidural analgesia*:* Epidural analgesia was performed before the induction of general anesthesia by a well-experienced anesthesiologist with at least 5 years of experience in local and regional anesthesia. Patients were in a sitting position leaning forward with the legs supported on a chair. Complete skin asepsis with povidone-iodine (7.5%) was applied, followed by draping. An 18-gauge Tuohy epidural needle was inserted into the intervertebral space T9-T10, using a vacuum catheter aspiration technique followed by the epidural catheter insertion. The epidural was activated at the end of the operation using 10 mL of 0.25% bupivacaine as a bolus followed by a continuous epidural infusion using 0.125% bupivacaine at a 6 mL/hour rate, to be continued for up to 24 hours postoperatively.

QL block technique**:** A bilateral posterior approach, a US-guided QL block, was applied after anesthesia induction by a well-experienced anesthesiologist with at least 5 years' experience in local and regional anesthesia, using Honda electronics HS-2100 portable US machine (Honda Electronics CO., LTD, Japan). The patient was in a supine position with a pillow under his back. Povidone-iodine (7.5%) was used to sterilize the area above the iliac crest at the level of the anterior axillary line, followed by draping before applying a high-frequency superficial probe (9–11 MHz). The probe was adjusted until visualization of the external oblique muscle, the internal oblique muscle, and the transversus abdominis muscle. Then the probe was moved posteriorly until the thoracolumbar fascia covering the QL muscle was visualized. The needle was inserted just above the upper edge of the probe and pierced the muscles until it reached the posterior aspect of the QL muscle. Aspiration was done to ensure no blood and ensure extravascular injection to avoid the undesirable systemic effect. The correct site was confirmed through saline injection (hydro dissection); 25 mL of 0.25% bupivacaine were injected on each side.

Fluid balance was maintained throughout the operation, using a fluid chart to avoid any hemodynamic instability that might affect the objective of this study.

Postoperative study parameters. Patients were transferred to the intermediate care unit for continuous observation for 24 hours. A 10-point visual analog scale (VAS) was used to assess pain, with 0 being no pain and 10 being the worst pain. The VAS score was assessed immediately after patients' transfer from the theater room (0 hours), then 2, 6, 8, 12, 18, and 24 hours postoperative. A blinded anesthesiologist assessed the following parameters to the aim of the study:

- The time required for the first morphine dose and the cumulative morphine consumption for 24 hours were recorded as a ***primary outcome***. Morphine was given at a 0.05 mg/kg dose when the VAS score was >4.
- As a secondary outcome, postoperative kidney function was assessed using laboratory and US Doppler indices to compare it with the preoperative values. Laboratory tests included serum creatinine and blood urea nitrogen (BUN) compared with preoperative values.

Sample size calculation: The sample size PASS 11 program (NCSS Statistical software) was used to calculate the sample size justification. According to Aditianingsih et al. (2), the expected postoperative 24-hour cumulative dose of morphine consumption between the groups was 3±0.32 mg and 4±0.2 mg, the sample size of 30 patients/group, can detect this difference with a power of 100% and an alpha error of 0.05.

Statistical methods: The Statistical Package for Social Sciences statistics software version 22.0 (IBM Corp., Chicago, USA, 2013) analyzed the collected data after coding and tabulation. Quantitative data were expressed as mean ± standard deviation, whereas we used numbers and percentages for qualitative data. For quantitative variables, the authors used inferential analyses using the Shapiro-Wilk test for normality testing independent t-test in cases of 2 independent groups with normally distributed data. They paired t-test in cases of 2 dependent groups with normally distributed data. However, in qualitative data, inferential analyses of independent variables were done using the chi-square test for differences between proportions and Fisher's exact test for variables with small expected numbers. A log-rank test was used to compare the rate of morphine consumption. $P < 0.050$ was considered statistically significant.

Results

This study involved 60 patients who met the inclusion criteria after excluding 30 patients. Notably, 23 patients were excluded because of variable exclusion criteria, such as cardio cerebral vascular diseases, neurological disorders, bleeding disorders, and BMI of >35 kg/m^2, whereas 3 were excluded owing to refusal to participate in the study. Moreover, 64 patients were equally randomized to 2 groups with 32 patients each. The study group received the QL block (QL group), whereas the control group received epidural analgesia (EP group). Two patients were excluded from the QL group owing to unexpected prolonged colonic surgery because they needed colostomy with a high-level incision, whereas 2 other patients were also excluded from the EP group because of hemodynamic instability during the surgery. The remaining 60 patients were studied until the analysis level (Figure 1).

Patient characteristics such as age, sex, and ASA level were approximately similar in both study groups, with no significant difference observed ($p > 0.5$) (Table 1). No significant intraoperative hemodynamic changes were recorded during surgery, except for 2 cases who received EP who were excluded because the main objective is to assess the postoperative effect on kidney function. The included patients experienced minimal blood loss without a need for replacement.

Postoperative pain was assessed using a VAS score, which did not show significantly higher scores in the QL group at 0, 6, 18, and 24 hours, whereas the EP group showed a nonsignificant higher score at 2 hours. Morphine requirement was not significantly higher in the QL group. In addition, no significant differences were observed between the QL group and

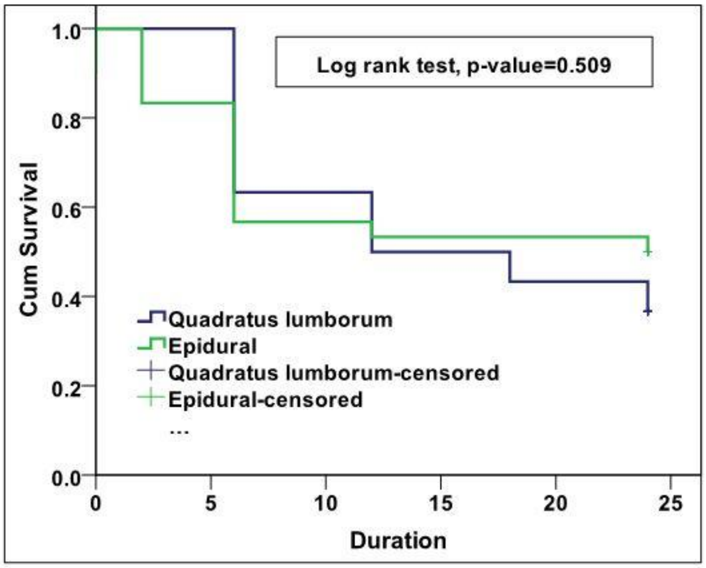

Figure 2. Kaplan Meier curve for morphine analgesia needed in the two studied groups.

the EP group in terms of the cumulative morphine dose for 24 hours. The first morphine dose was not significantly more delayed in the QL group. Regarding the percent of patients who required morphine, no statistically significant difference was observed between the 2 studied groups (Table 2) (Figure 2).

The preoperative and postoperative BUN values and creatinine indicated nonsignificant changes between the 2 study groups. No significant differences were noted between the QL block and the epidural in the pre-and postoperative change in BUN and creatinine levels (Table 3).

The preoperative renal RI, measured by renal Doppler, indicated a nonsignificant difference between the QL and EP groups. In contrast, the postoperative renal RI indicated a significantly lower RI level among the QL group patients, which is associated with a significant postoperative drop in the same patients. Patients who received epidural analgesia exhibited almost no changes between preoperative and postoperative RI (Table 4). These results may suggest QL block's role in improving renal perfusion postoperatively.

Among the patients who received QL block, 19 patients exhibited a postoperative decrease in the RI, 7 patients exhibited a postoperative increase in the RI, and the remaining 4 patients exhibited no postoperative changes in the RI compared with the preoperative RI. However, in terms of patients who received EP analgesia, 14 patients exhibited a postoperative decrease in RI, 11 patients exhibited a postoperative increase in the RI, and the remaining 5 patients exhibited no postoperative changes in RI (Figure 3).

Complications were recorded and found to be most common among patients in the EP group, which were recorded in 6 patients (20%): 1 case with headache and 5 cases with hypotension. However, complications were only recorded in 2 patients with QL block (6.7%): 1 with hypotension and 1 with lower limb weakness.

Discussion

The study aimed to examine the postoperative analgesic effect of QL block compared with the epidural analgesia and its effect on kidney function. The QL block and the epidural analgesia indicated no significant difference in postoperative analgesic effect. Moreover, no significant difference was found between both groups in kidney laboratory findings. However, QL showed significantly lower postoperative values concerning renal RI.

The importance of regional anesthesia is to control postoperative pain as a part of multimodal

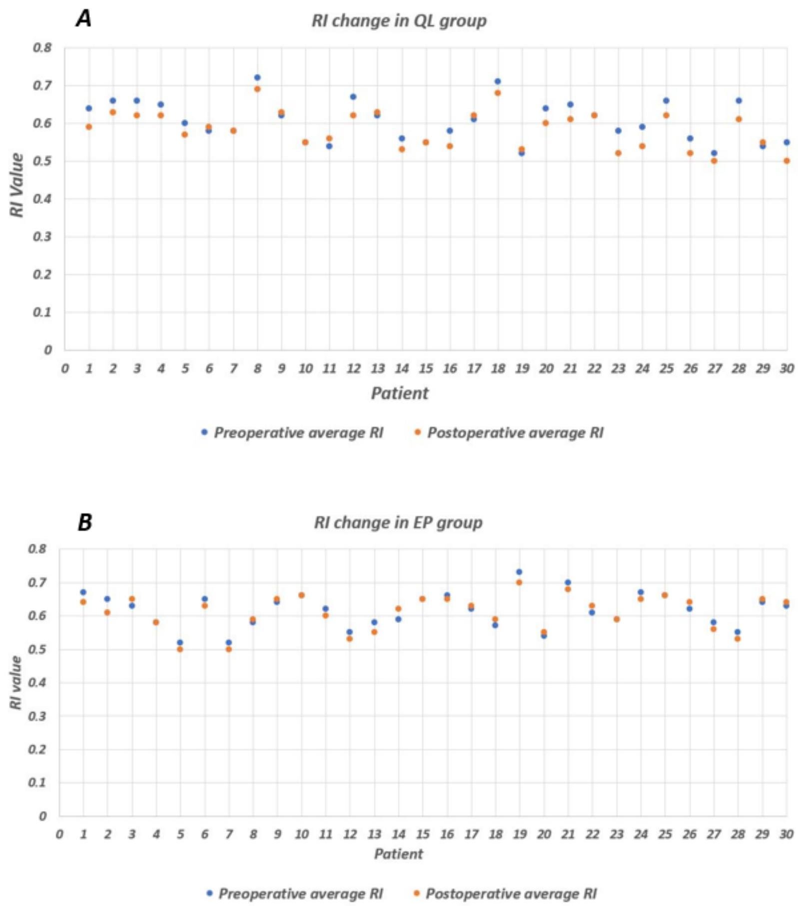

Figure 3. Shows the comparison between the Quadratus Lumborum block (A) and the Epidural analgesia (B) according to pre and postoperative renal resistive index (RI) measured by renal doppler.

analgesia that affects the patient's recovery and the incidence of postoperative complications (12).

Aditianingsih et al. (2) compared the analgesic effect of the QL block with the epidural analgesia but in patients that underwent laparoscopic nephrectomy. Moreover, they used epidural anesthesia as an ideal

Table 1: It shows the comparison between the two studied groups according to the demographic characteristics.

Variables		QL group (N=30)	EP group (N=30)	P-value
Age (years), Mean ± SD		52.1±7.0	52.6±6.9	^0.796
Sex (N, %)	**Male**	20 (66.7%)	21 (70.0%)	#0.781
	Female	10 (33.3%)	9 (30.0%)	
ASA (N, %)	**I**	15 (50.0%)	12 (40.0%)	§0.762
	II	12 (40.0%)	14 (46.7%)	
	III	3 (10.0%)	4 (13.3%)	

^Independent t-test. #Chi square test. §Fisher's Exact test

Table 2: Comparison of postoperative pain perception using VAS score, morphine analgesia requirement, cumulative dose, and the time to 1st dose.

Postoperative pain perception (VAS-10), Mean ± SD					
Variables	**QL group (N=30)**	**EP group (N=30)**	**P-value**	**Effect of QL relative to EP**	
				Mean ± SD	**95% CI**
Hour-0	2.0±1.4	1.8±1.4	^0.718	0.1±0.4	-0.6–0.9
Hour-2	0.7±0.6	1.3±1.7	^0.097	-0.6±0.3	-1.2–0.1
Hour-6	3.0±1.8	2.4±2.0	^0.233	0.6±0.5	-0.4–1.6
Hour-12	2.1±1.6	2.1±1.5	^0.869	0.1±0.4	-0.7–0.9
Hour-18	2.6±1.5	2.3±1.4	^0.482	0.3±0.4	-0.5–1.0
Hour-24	3.5±1.0	2.9±1.3	^0.066	0.6±0.3	0.0–1.2
Morphine analgesia					
Variables	**QL group (N=19)**	**EP group (N=15)**	**P-value**	**RR (95% CI)**	
				Mean ± SD	**95% CI**
Requirement (%)	63.3%	50.0%	#0.297	1.27 (0.81–1.99)	
Cumulative dose /24 hour (mg), Mean ± SD	3.1±1.2	3.1±1.2	^0.973	0.0±0.4	-0.8–0.8
Time to 1st dose (hour), Mean ± SD	9.5±7.3	5.9±6.0	^0.132	3.6±2.3	-1.1–8.4

^Independent t-test. #Chi square test. *Significant. RR: Relative risk. CI: Confidence interval

standard. No significant difference was found between the QL block and the epidural analgesia in postoperative pain, following the current study's findings. Nonetheless, they used a numerical rating scale at rest and in motion, in controversy for the VAS score used in the current study. The lowest postoperative pain score was found at 2 and 6 hours in both groups, whereas it was lowest at 0 and 2 hours postoperatively in the current study. Similar to the current study, there was no significant difference between the QL block and EP analgesia in the 24 hours' cumulative morphine dose and the first-time morphine initiation. Moreover, they noticed insignificant delayed morphine doses among patients who received QL block, reported in the current study (2).

Kikuchi et al. (13) found no significant difference regarding the postoperative analgesic effect of the QL block and the epidural analgesia in robot-assisted partial nephrectomy. Kumar et al. (14) studied the analgesic effect of QL block yet, compared with the transversus abdominis plane (TAP) block, and the total morphine consumption was significantly lower among patients receiving QL block. They used postoperative numerical pain intensity scale scores to assess postoperative pain and found a significantly lower pain score at 1–16 hours among patients receiving QL block. They concluded a better postoperative analgesic effect of QL block than the TAP block.

VAS scores may show a range of imprecision,

Table 3: Comparison according to pre and postoperative laboratory findings.

Variables		QL group (N=30)	EP group (N=30)	^P-value (groups)	Effect of QL relative to EP	
					Mean ± SD	95% CI
BUN (mg/dL)	Preoperative	15.5±3.5	14.6±3.7	0.339	0.9±0.9	-1.0–2.8
	Postoperative	15.4±3.0	14.5±3.1	0.278	0.9±0.8	-0.7–2.5
	⌂Change	-0.1±1.2	-0.1±1.2	0.913	0.0±0.3	-0.6–0.6
	#P-value (Pre vs post-operative)	0.639	0.763			
Creatinine (mg/dL)	Preoperative	1.08±0.25	1.04±0.25	0.608	0.03±0.06	-0.10–0.16
	Postoperative	1.04±0.21	1.06±0.26	0.747	-0.02±0.06	-0.14–0.10
	⌂Change	-0.04±0.10	0.02±0.15	0.130	-0.05±0.03	-0.12–-0.03
	#P-value (Pre vs post-operative)	0.063	0.636			

⌂Change=post-pre (negative values indicate reduction). ^Independent t-test. #Paired t-test. *Significant

owing to the postoperative perceptual-cognitive impairment experienced in the immediate postoperative period, but it is still commonly used to assess postoperative pain (15).

Chang et al. (16) similarly studied the effect of epidural analgesia on renal function among patients who underwent subtotal gastrectomy with general anesthesia. They found no difference in the renal functions when general anesthesia was combined with general anesthesia epidural analgesia. This is contrary to what Kambakamba et al. (17) reported, who found a higher incidence of AKI among patients undergoing major hepatectomy using epidural analgesia. However, no statistical significance was found in AKI incidence in cases with minor hepatic surgery.

The approach of using the vascular Doppler study, as an evaluation parameter of the vascular and hemodynamic effect of the anesthetic block, is common. Multiple researchers studied the hemodynamic changes affecting the brachial artery after brachial plexus block, using peak systolic velocity, RI, or pulsatility index. The brachial plexus block causes vasodilatation and increased blood flow in the brachial artery (18-21).

The renal afferent and efferent arterioles depend on an autoregulatory feedback hemostatic mechanism activated in cases with hypotension that may occur with epidural anesthesia. QL block records a lower incidence of sympathetic plexus involvement, decreasing the incidence of hemodynamic changes (22,23). Renal RI was used as a predictive parameter for AKI, after major abdominal surgery with a high risk of AKI incidence, owing to the fluid and perfusion maintenance challenges (11, 24). By the same theory, the current study attempted to use RI as an evaluation parameter to assess the effect of the QL block and EP analgesia on kidney perfusion. It was concluded that postoperative RI flow was significantly lower among patients who received QL block than EP analgesia, reflecting better kidney perfusion when using QL block. Hence, in patients at risk of developing postoperative AKI or patients with suspected intra- or postoperative deterioration of the kidney function, it is better to use QL block owing to its positive effect on

Table 4: Comparison of the pre and postoperative renal resistive index (RI) measured by renal doppler.

Variables		QL group (N=30)	EP group (N=30)	^P-value (groups)	Effect of QL relative to EP	
					Mean ± SD	**95% CI**
Renal resistive index	**Preoperative**	0.61±0.05	0.62±0.05	0.578	-0.01±0.01	-0.04–0.02
	Postoperative	0.58±0.05	0.61±0.05	**0.036***	-0.03±0.01	-0.05–0.00
	⌂Change	-0.03±0.02	0.00±0.02	**<0.001***	-0.02±0.01	-0.03–-0.01
	#P-value (times)	**<0.001***	0.158			

⌂Change=post-pre (negative values indicate reduction). ^Independent t-test. #Paired t-test. *Significant

renal flow.

The incidence of complications among the studied patients was higher in patients receiving EP analgesia. The well-known complications of epidural analgesia are hypotension, epidural hematoma, neural injury, and infection, such as meningitis and epidural abscess. Furthermore, in certain cases, when bleeding is expected, and a high level of anticoagulants may be required, as in aortic surgery, the anesthesiologist considers it is unsafe to place a thoracic epidural in such circumstances. In such cases, QL block may be a safe alternative and has almost the same effect as epidural analgesia (25,26). The complications that occurred among the QL block patients could be explained by the unusual extension of the analgesic agent to involve the lumbar plexus explaining the incidence of lower limb weakness, and their extension into the paravertebral space explains the incidence of hypotension (27). The incidence of lower limb weakness was reported in 1 patient in the current study, also recorded in Ueshima et al. (28) and Winker et al. (29).

Patients were only followed for 24 hours postoperatively. Kidney laboratory results were performed only once postoperatively. Thus, longer follow-up duration and repeated kidney functions are recommended, emphasizing the glomerular filtration rate (GFR). The sample size was calculated based on morphine requirements, not renal function.

Conclusion

QL block is a novel, safe regional anesthetic technique that provides postoperative analgesic effects comparable to epidural analgesia. In addition, the QL block improves the postoperative renal artery flow, which reflects a better kidney performance making it an ideal choice for patients with borderline kidney function or patients at higher risk of developing AKI.

Acknowledgment

None.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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