



Case Series

ULTRASOUND-GUIDED PERIPHERAL NERVE BLOCK AS POST-OPERATIVE MANAGEMENT OF LOWER ABDOMINAL SURGERY IN KSATRIA AIRLANGGA FLOATING HOSPITAL

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ABSTRACT

Introduction: Enhanced Recovery After Surgery (ERAS) implementation in remote areas by operating hospital ships is immensely helpful due to high patient turnover, reducing costs, and minimizing the effects of surgical stress. Utilization of regional anesthetics, namely ultrasound-guided Transversus Abdominis Plane (TAP) block or Quadratus Lumborum (QL) block, is applicable and beneficial in this setting. **Objective:** Due to the limited time, facilities, and health personnel available in floating hospital services surgery, several adjustments in anesthetic methods are required to rapidly return patients to their preoperative physiologic state. Therefore, we wrote this case report. **Case Series:** We presented case series of lower abdominal surgery performed in Ksatria Airlangga Floating Hospital with the implementation of peripheral nerve blocks as one of the ERAS protocols in one of the remote islands in Indonesia, Gili Iyang Island. Two patients underwent TAP blocks, while the remaining two received QL Blocks. A peripheral nerve block was performed under ultrasound guidance and a 20-mL injection of 0.25% levobupivacaine to QL muscle or TAP. During the observation, we found Visual Analogue Score (VAS) of 1-2 after surgery, no post-operative sedation needed, only 1 patient experienced nausea without vomiting, and the length of health facility stay were less than 3 days. Nearly all of our patients who underwent lower abdomen surgery got benefits from the application of peripheral nerve block. Because there was no opioid consumption in our cases, the risk of unwanted effect of opioids like postoperative nausea and vomiting, were also decreased. **Conclusion:** Peripheral nerve block, as mentioned TAP Block and QL Block, has emerged as a promising alternative to prevent and manage post-operative pain in remote medicine settings, namely Ksatria Airlangga Floating Hospital, particularly in areas with few medical facilities.

Keywords: ERAS; Floating Hospital; Good Health and Well-being; Ksatria Airlangga; Peripheral Nerve Block

ABSTRAK

Pendahuluan: Penerapan Enhanced Recovery After Surgery (ERAS) di daerah terpencil dengan penggunaan rumah sakit terapung sangat penting karena meningkatkan pergantian pasien, mengurangi biaya, dan meminimalisir efek stres pasca pembedahan. Anestesi regional seperti blok Transversus Abdominis Plane (TAP) atau blok Quadratus Lumborum (QL) dengan bantuan *ultrasound* dapat diterapkan dan bermanfaat dalam situasi ini. **Tujuan:** Keterbatasan waktu, fasilitas, dan tenaga kesehatan terkait layanan bedah di rumah sakit terapung memerlukan beberapa penyesuaian metode anestesi agar pasien dapat segera kembali ke keadaan fisiologis sebelum operasi. Oleh karena itu, kami menulis laporan kasus ini. **Serial Kasus:** Kami melaporkan serial kasus mengenai operasi daerah abdomen yang dilakukan di Rumah Sakit Terapung Ksatria Airlangga dengan penerapan blok saraf tepi sebagai salah satu protokol ERAS di salah satu pulau terpencil di Indonesia, Pulau Gili Iyang. Dua pasien menjalani blok TAP, sedangkan dua sisanya menerima Blok QL. Blok saraf tepi dilakukan

dengan panduan USG dan injeksi 20 mL levobupivacaine 0,25% ke otot QL atau TAP. Setelah observasi, seluruh pasien dengan Visual Analogue Score (VAS) 1-2 setelah operasi, lama rawat inap di fasilitas kesehatan kurang dari 3 hari dan tidak diperlukan sedasi pasca operasi. Hanya 1 pasien yang mengalami mual tanpa muntah. Semua pasien kami yang menjalani operasi perut bagian bawah mendapatkan manfaat dari penerapan blok saraf tepi. Karena tidak adanya penggunaan opioid, risiko efek opioid yang tidak diinginkan seperti mual dan muntah pasca operasi juga menurun. **Kesimpulan:** Blok saraf perifer, seperti Blok TAP dan Blok QL, telah muncul sebagai alternatif yang menjanjikan untuk mencegah dan menangani nyeri pasca operasi di lingkungan pengobatan terpencil, yaitu Rumah Sakit Terapung Ksatria Airlangga, khususnya di daerah dengan fasilitas medis yang terbatas.

Kata Kunci: ERAS; Rumah Sakit Terapung; Kesehatan dan Kesejahteraan yang Baik; Ksatria Airlangga; Blok Saraf Perifer

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INTRODUCTION

Enhanced recovery after surgery (ERAS) is an evidence-based approach to surgical care that aims to minimize the stress of surgery and facilitate patients to recover rapidly by preserving normal physiology (1). One of the important components of ERAS is the use of regional anesthesia to minimize the stress of surgery and reduce opioid use, Ultrasound-guided transversus abdominis plane (TAP) blocks or Quadratus Lumborum (QL) blocks, provide analgesia that might be superior to other techniques for some patients, namely oral pain medications or opioids (2).

Ksatria Airlangga Floating Hospital is a hospital ship that was established in 2017, providing health services and community development. A trip to Gili Iyang Island, from May 15–22, is one of the Ksatria Airlangga floating hospital trips to remote islands in 2022. We have surgical facilities and equipment on board, allowing doctors to perform surgery and anesthesia for indicated patients. The problem depicted in the previous hospital's ship design was not intended for medical treatment activities and does not adhere to hospital building or operating rooms guidelines. ERAS in this setting are highly beneficial due to patient's need for early mobilization, reducing costs through efforts to

quickly return patients to their preoperative physiologic state and diminishing the effects of surgical stress.

Limited time and facilities in floating hospital services and limited monitoring facilities, health personnel, and equipment or drugs in the remote island require several adjustments in anesthetic methods to rapidly return patients to their preoperative physiologic state. Therefore, we wrote this case report.

CASE SERIES

Here we present 4 cases of lower abdomen surgery performed in Ksatria Airlangga Floating Hospital during the trip to Gili Iyang Island with implementation of peripheral nerve blocks as one of ERAS protocols. The inclusion criteria of this case series are that patients must be above the age of 17 and scheduled for lower abdominal surgery. The surgery should take no more than two hours and require a PS ASA score of 1-2. The exclusion criteria are: 1. Prolonged operative duration, 2. Switching from regional to general anesthesia during the surgery 3. History of cerebrovascular and cardiovascular accidents (stroke, Congestive Heart Disease, history of heart surgery, cardiac stent, anticoagulant or antiplatelet therapy, and/or congenital heart

defects), 4. Any history of spinal abnormalities, 5. wounds or infections at the puncture site, 6. Coagulopathy, or history of spontaneous bleeding without any clear cause, 7. haemodynamic disturbances/shocks, 8. Patients with respiratory failure, or, 9. There are signs of increased ICP (severe headache, nausea, projectile vomiting, and/or decreased

consciousness), 10. There is no history of drug allergies related to the medication being administered; and 11. The patient or family does not consent.

In this case series, the sample collection technique is total sampling (all eligible patients will receive the same treatment), and there is no control group.

Table 1. Clinical Characteristics, Durante, and Post-operative Data of Patients

Variable	Case 1	Case 2	Case 3	Case 4
Age (years)	58	62	50	50
Weight (kg)	65	45	54	50
Height (cm)	157	156	152	152
Previous or current health condition and medication	Hypertension, diabetes, and other past medical history denied, no medication taken regularly	Hypertension, diabetes, and other past medical history denied, no medication taken regularly	Hypertension, diabetes, and other past medical history denied, no medication taken regularly	Hypertension, diabetes, and other past medical history denied, no medication taken regularly
Vital Sign before surgery				
Blood Pressure (mmHg)	145/90	118/60	157/94	150/80
Pulse (x/minute)	70	55	80	95
SpO ₂ (%)	98	98	99	99
Respiratory Rate (x/minute)	18	18	19	18
Temperature (°C)	36.5	36.8	36.6	36.6
Diagnosis; Surgery Type	Hydrocele; Incision and drainage	Right Lateral Reducible Hernia; Herniotomy and Hernioraphy	Right Lateral Reducible Hernia; Herniotomy and Hernioraphy	Right Lateral Reducible Hernia; Herniotomy and Hernioraphy
ASA	2	2	2	2
CRI	2	2	2	2
Anesthesia	Low-dose spinal anesthesia with hyperbaric Bupivacaine 12.5 mg	Low-dose spinal anesthesia with hyperbaric Bupivacaine 12.5 mg	Low-dose spinal anesthesia with hyperbaric Bupivacaine 12.5 mg	Low-dose spinal anesthesia with hyperbaric Bupivacaine 12.5 mg
PONV Prophylaxis and Preventive Analgetic	Ondancetron 8 mg IV, paracetamol 1 gram as preventive analgetic	Ondancetron 8 mg IV, paracetamol 1 gram as preventive analgetic	Ondancetron 8 mg IV, paracetamol 1 gram as preventive analgetic	Ondancetron 8 mg IV, paracetamol 1 gram as preventive analgetic
PNB Technique (QL/TAP Block)	QL Block (injection of 0.25% levobupivacaine 20 mL with Ultrasound guidance) (Fig.1-A)	QL Block (injection of 0.25% levobupivacaine 20 mL with Ultrasound guidance)	TAP Block (injection of 0.25% levobupivacaine 20 mL with Ultrasound guidance) (Fig.1 - B)	TAP Block (injection of 0.25% levobupivacaine 20 mL with Ultrasound guidance)
Vital Signs after surgery				
Blood Pressure (mmHg)	130/90	120/80	120/80	145/80
Pulse (x/minute)	72	60	68	80
SpO ₂ (%)	99	99	99	99
Respiratory Rate (x/minute)	18	18	19	19
Temperature	36.5	36.5	36.5	36.5

Variable	Case 1	Case 2	Case 3	Case 4
VAS 2 hours after surgery	1	2	1	1
Continuation of Table 1. Clinical Characteristics, Durante, and Post-operative Data of Patients				
Variable	Case 1	Case 2	Case 3	Case 4
VAS D-1	VAS 2 when moving, VAS 1 without moving	1	1	1
Rescue Opioid	No	No	No	No
Bromage Score	4	4	4	4
PONV	No	Nausea without vomiting	No	No
Post-operative drug	IV Ketorolac 30 mg once, followed by paracetamol 1 gram q8hr and orally mefenamic acid 500 mg q8hr	IV Ketorolac 30 mg once, followed by paracetamol 1 gram q8hr, orally mefenamic acid 500 mg q8hr, and antacid q8hr	IV Ketorolac 30 mg once, followed by paracetamol 1 gram q8hr and orally mefenamic acid 500 mg q8hr	IV Ketorolac 30 mg once, followed by paracetamol 1 gram q8hr and orally mefenamic acid 500 mg q8hr
Length of Stay (days)	1	3	1	1

DISCUSSION

The Floating Hospital Ksatria Airlangga frequently engages in social service activities that span between one to two weeks each year around the Indonesian archipelago. On this trip, health-worker volunteers include two surgeons, two anesthesiologists, an obstetrician-gynecologist, a dentist, and two surgical nurses.

This hospital ship equipped with one operating room that can accommodate two operating tables for minor to major procedures. The recovery room in front of the operating

room at the Floating Hospital Ksatria Airlangga is designed for one patient with one vital sign monitor (3). The type of surgery performed is short duration of surgery, around 1-2 hours, easy to moderate cases, (not surgery involving the airway), and the PS-ASA of the patient must be 1-2. We also have tools and medicines to handle airway, respiration, and circulation emergencies in limited quantities (supply depends on the amount brought at the start of the mission departure and the amount that has been used during surgery in the previous island).

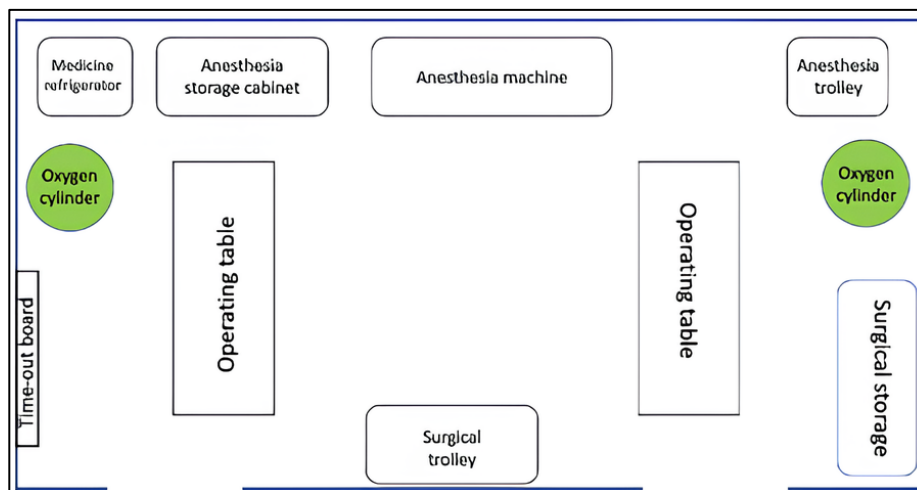


Figure 1. Detail of Ksatria Airlangga Floating Hospital Operating Room (3)

Effective pain relief is of the utmost importance to anyone treating patients undergoing surgery. The objective of postoperative pain management is to reduce or eliminate pain and discomfort with a minimum of side effects to promote early mobilization and recovery.

ERAS protocol is highly recommended in medical services based on remote medicine as Ksatria Airlangga Floating Hospital, due to transportation and limited facility.

Postoperative pain management is limited to administering paracetamol, NSAIDs, or a combination. In previous operational missions of Ksatria Airlangga Floating Hospital, postoperative administration of opioids was avoided due to the short transit time of the medical team, limited health workers and monitoring facilities on the remote island, as well as the unavailability or limited availability of equipment and drugs for emergency treatment if side effects from using opioids occurred.

The Gili Iyang Island has one Community health center, and only one nurse and four midwives were accessible as healthcare workers. One general practitioner resides in Sumenep island and only comes to Gili Iyang island three days in a week. There were no monitors, and only oral medication was available. Intravenous medicine was not always available, depending on the supply from the bigger island. Monitoring of patients' conditions and outcomes were difficult, and in this mission, we only had a few days to observe and monitor all patients' conditions before we continued our trip to the next island.

In this situation, peripheral nerve block has emerged as a promising alternative for preventing and managing postoperative pain. Nearly all of our patients who underwent lower

abdomen surgery got the benefits from the application of peripheral nerve block as mentioned QL Block and TAP block, which was proven by Visual Analogue Score (VAS) of 1-2 after surgery, no post-operative sedation needed, only 1 patient experience nausea without vomiting, and the length of health facility stay were less than 3 days.

When measured on a visual analog scale or a numerical rating scale, QLB has a remarkable analgesic effect, reducing pain to a 1-2/10, and this effect often lasts for more than 24 hours. This finding is consistent with a study by Ishio, et al., which found that patients who receive QLB as part of postoperative pain therapy experience less discomfort when resting and moving, which is important for early mobilization. (4)

Patients who received QL blocks experienced less pain following surgery without experiencing the unfavorable impacts of opioids, such as nausea, vomiting, and itching (5). A randomized controlled trial by Krohg, et al. demonstrated a opioid-sparing effect of the QL block during the first 24 hours postoperatively after cesarean delivery, when administered with multimodal analgesia in the absence of neuraxial morphine, and reduced VAS post-operatively (6). Another study by McDonnel, et al. described patients receiving active no-opioid consumption in our cases, the risk of the unwanted effects of opioids like postoperative nausea and vomiting was also decreased.

TAP blocks were also performed in our patient due to difficulties in QL muscle identification. QLB was usually performed with a high-frequency linear probe (5-10 MHz) which is attached to the triangle of Petit until the QL is confirmed (7). Unfortunately, our floating hospital only had access to convex

array ultrasound probes. Due to limited time and facility, TAP blocks were performed as an alternative.

The QL block, a regional variant of TAP blocks, has been proposed as a more reliable method for treating pain following abdominal surgery when compared to TAP blocks. A meta-analysis by Liu, *et al.* which included 8 RCTs involving 564 patients found that after abdominal surgery, QL block offers better pain control while using less opioids than TAP block. In terms of PONV, TAP and QL blocks are identical (8,9).

In the QL Block, local anesthetics may spread from the trans to the paravertebral space, resulting in an indirect paraspinal block. Therefore, it has an effect on both visceral pain and abdominal incision pain (10). QL block also provides a more extensive spread of injectate (T10-L3vs.T10-T12) (11).

Some scholars also found that the two treatments have the same postoperative analgesic effects and are equally likely to cause adverse reactions. Zhu *et al.* discovered no significant difference in VAS ratings between patients receiving QL and TAP blocks 4 and 8 hours after surgery (9,12).

After we left the island, monitoring was performed by contacting the nurses in charge and there were no complaints or other symptoms after the surgery.

In this case series, all patients receive the same treatment. The limitation of this case series is the absence of a control group to compare the VAS, PONV, and LOS between the treatment and control group, and the outcome of PNB actions is operator-dependent (depending on the volunteer anesthesiologist taking part in the mission).

CONCLUSION

Peripheral nerve blocks such as TAP Block and QL Block have become a promising adjuvant therapy to traditional postoperative pain management to prevent and manage post-operative pain in remote medicine such as Ksatria Airlangga Floating Hospital. In all patients we found VAS of 1-2 after the surgery, less post-operative nausea and vomiting, no post-operative sedation needed, and length of health facility stay less than 3 days.

To better understand the efficacy of this PNB method, further research is recommended, including a control group to compare VAS, PONV, and LOS between the treatment and control groups. Besides, a thorough cost analysis needs to be carried out in order to evaluate the viability of this method ensuring it remains an economically feasible alternative for social services. The method should be validated to ensure it is safe and comfortable for patients, as demonstrated by favorable VAS, PONV, and LOS.

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Conflict of Interest

There is no conflict of interest.

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Author Contribution

VLS, AH, and KMF conceived of the presented idea. VLS, SCS, JDS, MHK, IPA, RTA, BMK, and IKM contributed to the patient's follow-up, collection of data, draft manuscript preparation, and revision. VLS and SCS contributed to the analysis and

interpretation. KMF and AH contributed to organizing, supervising, and mentoring during the process. All authors reviewed the results and approved the final version of the manuscript.

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