ORIGINAL RESEARCH

Quadratus Lumborum Block Type II Versus Transversus Abdominis Plane Block For Postcesarean Analgesia: A Randomized Double Blinded Trial.

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ABSTRACT

Multimodal analgesia including neuraxial opioids, systemic opioids, nonsteroidal anti-inflammatory drugs, local wound infiltration and regional blocks are preferred after cesarean section to reduce opioid consumption and to provide synergistic or additive analgesia. There have been studies comparing analgesic efficacy of quadratus lumborum block (QLB) type II over transversus abdominis plane (TAP) after cesarean delivery, which however fail to provide consistent results in terms of significant difference in post operative analgesia while comparing both blocks. **Aims:** To identify a superior analgesic technique for post cesarean analgesia by comparing QLB type 2 with TAP block as part of multimodal analgesia. **Methods:** Eighty parturients scheduled for elective caesarean section under spinal anaesthesia during 2022 to 2023 in a tertiary care hospital in Ernakulam were randomized to receive QLB type 2 (group1) and TAP block (group 2). The primary outcome was to compare cumulative tramadol consumption at predetermined time intervals. Secondary outcomes included the quality of postoperative analgesia using pain rating scale, duration of postoperative analgesia, cumulative supplemental analgesic consumption, sensory dermatomal involvement, comparison of side effects. **Results:** The study showed statistically significant differences between the two groups with respect to cumulative tramadol consumption 12 h and 24 h; Numerical Pain Rating scores (NRS) at 12 h and 24 h; the duration of post operative analgesia; cumulative supplemental analgesic dose consumption up to 24 h; sensory dermatomal spread six hours and 12 h and sedation scores and nausea. **Conclusions:** QLB type II reduced opioid and other analgesic requirements and provided with longer lasting analgesia, as compared to TAP Block after cesarean section.

Keywords: Caesarean Section, Pain Scores, Quadratus Lumborum Block,

Introduction:

Cesarean section (CS) remains one of the commonly performed surgeries in this world. Acute Post-cesarean pain is moderate to severe in nature . Adequate post operative analgesia provides subjective comfort, inhibit nociceptive impulses and blunt the neuro endocrine response to pain improving restorative function. It also aids in early mobilization, a key factor to prevent risk of thromboembolic disease, commonly seen with pregnancy. It also enhances care of the newborn and breastfeeding. Analgesic of choice should include options with minimal transfer in breast milk, little or no effects on neonates, reduced maternal side effects, no interference with caring of the newborn or discharge from hospital.

Perioperative care has been improved with the implementation of Enhanced Recovery After Caesarean protocol. It is an evidence-based system to improve maternal outcomes, functional recovery, bonding between mother and baby as well as patient satisfaction . Pain management being a crucial component, they suggest multimodal analgesia for efficient pain control. Various methods have been followed to provide post caesarean analgesia including non steroidal anti-inflammatory drugs (NSAIDS), intrathecal or systemic opioids, local wound infiltration, truncal blocks.

Neuraxial anesthesia is the anesthetic technique of choice for CS . Opioids have been added to the local anesthetic in the intrathecal space to enhance and prolong intraoperative and postoperative analgesia, morphine and fentanyl being commonly preferred for the same. In a systematic review of randomized controlled trials assessing the intraoperative and postoperative analgesic efficacy and adverse effects of intrathecal opioids in patients undergoing cesarean section with spinal anesthesia, they concluded that addition of intrathecal morphine to the local anesthetic produced a clinically relevant reduction in postoperative pain and analgesic consumption . Even though intrathecal opioids contribute to postoperative analgesia, there is risk of postoperative pruritis as well as nausea and vomiting with morphine. Multimodal approach including neuraxial opioids, systemic opioids, nonsteroidal anti-inflammatory drugs, local wound infiltration and regional blocks are thus preferred after cesarean section to reduce opioid consumption and to provide synergistic or additive analgesia .

Peripheral nerve block techniques including transversus abdominis plane block, quadratus lumborum block, surgical wound infiltration have been investigated to assess analgesic efficacy in the post-cesarean delivery period . Transversus Abdominis Plane (TAP) block is a field block of the thoracolumbar nerves (T6 to L1), that run in the fascial plane between the internal oblique muscle and the transversus abdominis muscles. Studies have shown that post cesarean TAP in the absence of intrathecal morphine have produced significant reductions in systemic opioid requirements . The major disadvantage of TAP block is that it does not provide visceral analgesia, which explains why several studies have failed to show superiority of TAP as a primary mode of postoperative analgesia when compared with standard multimodal analgesia with intrathecal morphine. There have been evidence showing high plasma levels of local anesthetic and neurological symptoms attributable to local anesthetic systemic toxicity after post cesarean TAP .
The Quadratus Lumborum Block(QLB) technique was first described using ultrasound to trace the transversus abdominis more posteriorly until the transversus aponeurosis appears . The thoracolumbar fascia surrounding the quadratus lumborum muscle contains nerve fibres like cutaneous branches of the iliohypogastric, ilioinguinal, subcostal nerves. The local anesthetic injected into this plane can also track into the paravertebral space which can potentially affect the sympathetic chain, accounting for the visceral analgesia (in contrast to TAP). Quadratus lumborum block has shown to be effective in reducing postoperative opioid consumption and pain scores in patients undergoing cesarean delivery .

There are few studies comparing analgesic efficacy of QLB and TAP block for post cesarean analgesia.

Methodology:

After obtaining institutional ethical committee approval, our randomized double blinded study was carried out in the operation theatre and postoperative ICU in a tertiary care hospital at Ernakulam between June 2022 and June 2023. We included parturients with American society of anaesthesiologists physical status II (ASA PS II) having a normal singleton pregnancy with a gestation of at least 37 weeks, scheduled for elective CS under spinal anaesthesia. We excluded any failed/ inadequate spinal, those who were unable to comprehend or use the verbal rating pain scoring system, ASA PS grade III and more, prior epidural placement for labour analgesia during the same hospital encounter, known allergies to any of the drugs used in the study, coagulopathy, pre-existing peripheral neuropathies, anatomic abnormalities and localised infection.

Eighty parturients scheduled for elective CS under spinal anaesthesia who meets the inclusion criteria where blinded and randomized using computer generated random table and allocated into two groups (Group QLB (group 1) and Group TAP (group 2)) to give respective intervention and to be analysed. A single anaesthetist was selected to administer both the blocks and he was told to select the type of block for each eligible patient who were randomized and allocated with sealed envelopes. The researcher then assessed post operative parameters at regular intervals at recovery. The researcher was also blinded to the type of block received by the patient to avoid any possible bias. Thus, it was a double blinded study. Both groups (forty each) received 0.2% ropivacaine 20 ml on each side. Both blockprocedures were performed at the end of surgery before transfer to the postoperative intensive care unit (ICU).

After reviewing the patients the day prior to surgery, they were kept nil per oral – eight hours for solid foods, two hours for clear fluids. The patients received oral tablet 40-mg pantoprazole and 10 mg metoclopramide as anti-aspiration prophylaxis evening day before surgery and morning day of surgery. Informed written consent regarding anesthesia and postoperative analgesia (including blocks) were obtained from all patients included in the study. In the operating room, 16 G or 18 G intravenous cannula were secured and preoperatively Ringer's lactate infusion eight ml/kg/hr started. Spinal anaesthesia and intraoperative management were executed in the usual manner. At the end of surgery, all patients received rectal diclofenac (100 mg) and one gram of intravenous paracetamol and were shifted to the ICU.

In the ICU, ultrasound guided quadratus lumborum type 2 block (QLB) or transversus abdominis plane (TAP) block was performed under aseptic precautions by a single anesthetist expert in both the regional techniques. A broadband (5-8 MHz) convex transducer (Sono site EDGE Portable Ultrasound System; Sono Site, Bothell, Washington) was used, and imaging depth was set between one and nine cm.

The transducer was placed at the level of the anterosuperior iliac spine and moved cranially until the three abdominal wall muscles were clearly identified in order to perform quadratus lumborum type II block. The external oblique muscle was followed posterolaterally until its posterior border was visualized (hook sign), leaving underneath the internal oblique muscle, like a roof over the quadratus lumborum muscle. The probe was tilted down to identify a bright hyperechoic line that corresponds with the middle layer of the thoracolumbar fascia. Then a 22-gauge spinal needle was inserted in plane from anterolateral to posteromedial. The optimal point of injection for the QLB type 2 block was determined over the lumbar interfacial triangle using hydro dissection. The transducer was placed at the level of the anterosuperior iliac spine and the probe also moved cranially until the three abdominal wall muscles were clearly identified. The point of injection was under the fascia between the internal oblique and transversus abdominus muscle for transversus abdominis plane block. The same type of needle was inserted in plane from medial to lateral position.

The patients continued to receive intravenous paracetamol one gram eight hourly in both groups. The patients were evaluated using the numerical pain rating scale (NRS), a categorical scale from zero to ten, where zero represents 'no pain at all' and ten represents 'the worst pain ever possible'. Patients were asked to report the number between zero to ten that fits best to their pain intensity. Patients were evaluated at zero, one two, four, six, 12, and 24 hours postoperatively for pain and side effects (sedation, itching, nausea), by the main investigator, blinded to the used method. If NRS score was more than or equal to four, the patients received rescue analgesia in the form of intravenous tramadol 100 mg as bolus. Supplemental analgesia was provided in the form of diclofenac suppository 100 mg. Our primary 38 outcome measured was the cumulative tramadol consumption at predetermined time intervals (zero, one two, four, six, 12, and 24 hours) after surgery. Secondary outcomes included, duration of postoperative analgesia, cumulative supplemental analgesic consumption. A cutaneous sensory blockade was assessed bilaterally on the anterior axillary line using a 22-gauge slightly dulled needle for loss of pin-prick sensation. Number of dermatomes involved were recorded and compared with reference to T10 dermatome (at the level of umbilicus). When the sensory block levels were cranial to the T10 dermatome, the affected dermatomes were defined using positive numbers. Heart rate, respiratory rate, oxygen saturation, and noninvasive blood pressure, sedation scores (Ramsay scale), itching (0, none; 1, mild; 2, moderate; and 3, severe), nausea (0, none; 1, mild; 2, moderate; and 3, severe or vomiting), and other complications were documented. Four milligrams of intravenous ondansetron was provided for nausea and vomiting. Data collection was continued for 24 hours with both the patients and person collecting the data blinded to group allocation.

Statistical analyses were performed with SPSS software version 20. Data entered as numerical or categorical. Categorical variables were represented by frequency and percentage. Numerical variables were represented by mean and standard deviation. Binary logistic regression was performed to compare categorical variables between groups. Independent sample t-test and Mann-Whitney test were performed to compare numeric variables between groups. A p-value less than 0.05 is taken as statistically significant.

Results:

Our study group comprised of 80 parturients, with 40 patients randomly allocated to each group. The flow of patients in the trial is shown in the consort flow diagram (figure 1).

Statistically significant differences were seen in both groups with respect to cumulative tramadol consumption, Numerical Pain Rating scores (NRS), duration of post-operative analgesia, requirement of supplemental analgesia, sensory dermatomal involvement and sedation scores.

Primary outcome measured was the cumulative tramadol consumption at definite time intervals post-cesarean for both blocks. The cumulative tramadol consumption in Quadratus Lumborum Block (QLB) type II group was significantly lower than group Transversus Abdominis Plane (TAP) at 12 hours (0.08+/- 0.35 vs 0.68+/-0.53) and 24 hours (0.30+/-0.72 vs 1.80+/-0.56) and the results are presented in Table 1, Figure 2.

NRS scores were significantly reduced in the QLB group than in the TAP group at first h(1.2+/-1.49 vs 2.55 +/- 1.08), second h (2.08 +/-1.47 vs 3.05 +/- 0.22), fourth h (2.70 +/- 1.09 vs 3.28 +/- 0.51), sixth h (2.95 +/- 0.99 vs 3.80 +/- 0.72), 12 h (3.10 +/- 0.96 vs 4.83 +/- 0.55) and 24 h(3.23 +/- 1.07 vs 5.18 +/- 0.50) post-surgery as depicted in Table 2, Figure 3.

Table 3, Figure 4 shows that the duration of postoperative analgesia was significantly higher in Group QLB (21.80± 5.988 hours) compared to Group TAP (12.85 ± 5.763 hours).

Requirement of supplemental analgesia was found to be higher in Group TAP (0.825 ± 0.594) compared to Group QLB (0.125 ± 0.404) (Figure 5). The number of dermatomes involved above the in

Discussion:

The transversus abdominis plane (TAP) block is a well-established truncal block being performed for postoperative analgesia after abdominal surgeries. When used as part of multimodal analgesia, adds analgesic benefit to the patients, reducing postoperative opioid requirements. There are various studies comparing the efficacy of quadratus lumborum block (QLB) with TAP block for post operative analgesia. The results with regard to difference in the analgesic efficacy of blocks have been inconclusive in previous studies.

The present study was intended to identify a superior truncal block technique as part of multimodal analgesia for post-caesarean analgesia. The parturients posted for elective caesarean section were randomized into two groups and received either ultrasound guided QLB or ultrasound guided TAP blocks along with regular analgesics. Local anaesthetic of choice was 0.2 % ropivacaine, given 20 ml bilaterally on each side. Ropivacaine has a better safety profile than bupivacaine. The primary outcome measured was cumulative tramadol consumption in both blocks after CS under spinal anaesthesia. The quality of post-caesarean analgesia was assessed using numerical pain rating scale, duration of post operative analgesia, cumulative supplemental analgesic consumption, sensory dermatomal distribution. Complications of rescue analgesic including sedation scores, nausea, vomiting and itching were also measured.

Intravenous Tramadol 100 mg boluses were used as the rescue analgesic (when numerical pain rating scale (NRS) score was more than or equal to four). Cumulative consumption of tramadol doses was assessed at hours one, two, four, six, 12 and 24 after surgery. In the present study, the cumulative consumption of tramadol doses was significantly higher in patients who received transversus abdominis plane (TAP) block than quadratus lumborum type II block (QLB) at 12 hours and 24 hours. This observation correlates well with the study done by Rafael Blanco et al where they compared QLB with TAP block for post caesarean analgesia using

In the present study, post operative analgesia was assessed during the first 24 hours, at hours zero, one, two, four, six, 12 and 24 using NRS score. NRS scores at hours one, two, four, six, 12 and 24 were significantly lower in QLB group than TAP group. Immediately after surgery, at zero hour, there was no pain in both groups. This may be due to the early postoperative pain relief provided by the residual effects of spinal anaesthesia, one-gram intravenous paracetamol, 100 mg diclofenac suppository given empirically at the end of surgery. This is similar to the study done by Marawan Elkady et al where they compared QLB with TAP block for postoperative analgesia in patients undergoing elective CS . They showed postoperative pain conception at hours 2, 4, 6, 12 and 24 was significantly lower in QLB group than TAP group. In another study done by Usha Shukla et al comparing both blocks showed similar results . They randomly allocated 105 patients posted for elective total abdominal hysterectomy under spinal anaesthesia to receive either QLB or TAP as part of postoperative analgesia. On comparing both blocks, pain scores were significantly lower with QLB at second and sixth hour with p value of 0.003 and 0.001, respectively. The findings of the present study were also comparable with study done by Abik Mallik et al where they compared quality of postoperative analgesia after Ultrasound guided TAP block versus QLB block for lower abdominal gynaecological surgeries under general anaesthesia using ropivacaine 0.2 % with clonidine . Mean pain scores on movement of TAP block were significantly higher after six hours, 12 hours, and 18 hours ($p = 0.01$).

In our study, the duration of postoperative analgesia was found to be significantly higher in QLB group than TAP group($p = 0.001$). In the study done by Abik Mallik et al where they compared quality of postoperative analgesia after Ultrasound guided TAP block versus QLB block for lower abdominal gynaecological surgeries under general anaesthesia using ropivacaine 0.2 % with clonidine, time to requirement of first dose of rescue analgesic was significantly higher in QLB group than TAP block group ($p < 0.001$). Xiancun Liu et al did a systematic review and meta-analysis of several randomized

Diclofenac 100 mg suppository was given as supplemental analgesic. The total number of supplemental analgesic doses was significantly higher in TAP group than the QLB group up to 24 hours after surgery.

The sensory dermatomal involvement cranial to the T10 dermatome were defined using positive numbers and was found that the dermatomal spread was significantly higher in QLB group compared to TAP group at both six hours and 12 hours. This is comparable with the study done by Takeshi Murouchi et al. Patients received bilateral single injection QLBs (20 ml of 0.375 % ropivacaine per side) in patients scheduled for laparoscopic ovarian surgery under general anaesthesia . The results were retrospectively compared with the results of their previous study on lateral TAP block. They were able to show that QLB affected T7 – T12 dermatomes, whereas TAP block affected T10 – T12. Another observational comparative study done by Yuki Aoyama et al comparing analgesic effects and distribution of cutaneous sensory blockade of QLB type 2 and posterior TAP block showed that a significantly higher percentage of dermatomes showed a loss of pin – prick sensation in the QLB group as compared with the TAP block group .

Modified Ramsay sedation scale was used for the assessment of sedation at hours zero, one, two, four, six, 12 and 24 after surgery. It was found that the patients who received QLB had significantly lower sedation scores at 12 hours and 24 hours after surgery than who received TAP block.

The present study has shown that QLB type II is a superior regional analgesic technique than TAP block for post cesarean analgesia in terms of reduced cumulative tramadol consumption, increased duration of post operative analgesia, reduced need for cumulative supplemental analgesia, higher sensory dermatomal involvement and fewer opioid related side effects. The present study had several limitations. For ethical reasons, no control group was considered and this ensured that every patient received the post operative analgesic benefits of a truncal block. All patients received intravenous paracetamol one gram thrice daily as basal analgesic, which would have obscured the differences between the two groups in terms of pain scores, requests for rescue analgesic and supplemental analgesics. Parameters pertaining to analgesic efficacy in the post operative period beyond 24 hours of surgery were not measured and the same remains unknown.

CONCLUSION:

Quadratus Lumborum Block (QLB) type II reduced opioid and other analgesic requirements and provided with longer lasting analgesia, as compared to Transversus Abdominis Plane (TAP) Block in cesarean section. The present study showed that a total of 40 ml 0.2 % Ropivacaine injected bilaterally in QLB provides adequate analgesia for 24 hours in the postoperative period, providing a more consistent and longer duration analgesia than TAP block. The incidence of sedation and nausea were less in QLB group than in TAP group. It can thereby be concluded that ultrasound guided QLB type II provides safer and superior postoperative analgesia when compared with TAP block as part of multimodal analgesia for parturients undergoing cesarean section under spinal anesthesia. Further studies should be directed towards comparison of these two types of blocks as part of multimodal analgesia in abdominal surgeries and should have components like time to ambulation, quality of recovery at 24 hours and at three months, readiness to discharge home as primary objectives.

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TABLES AND FIGURES:

FIGURE 1 ; Representation of randomisation process in the study:

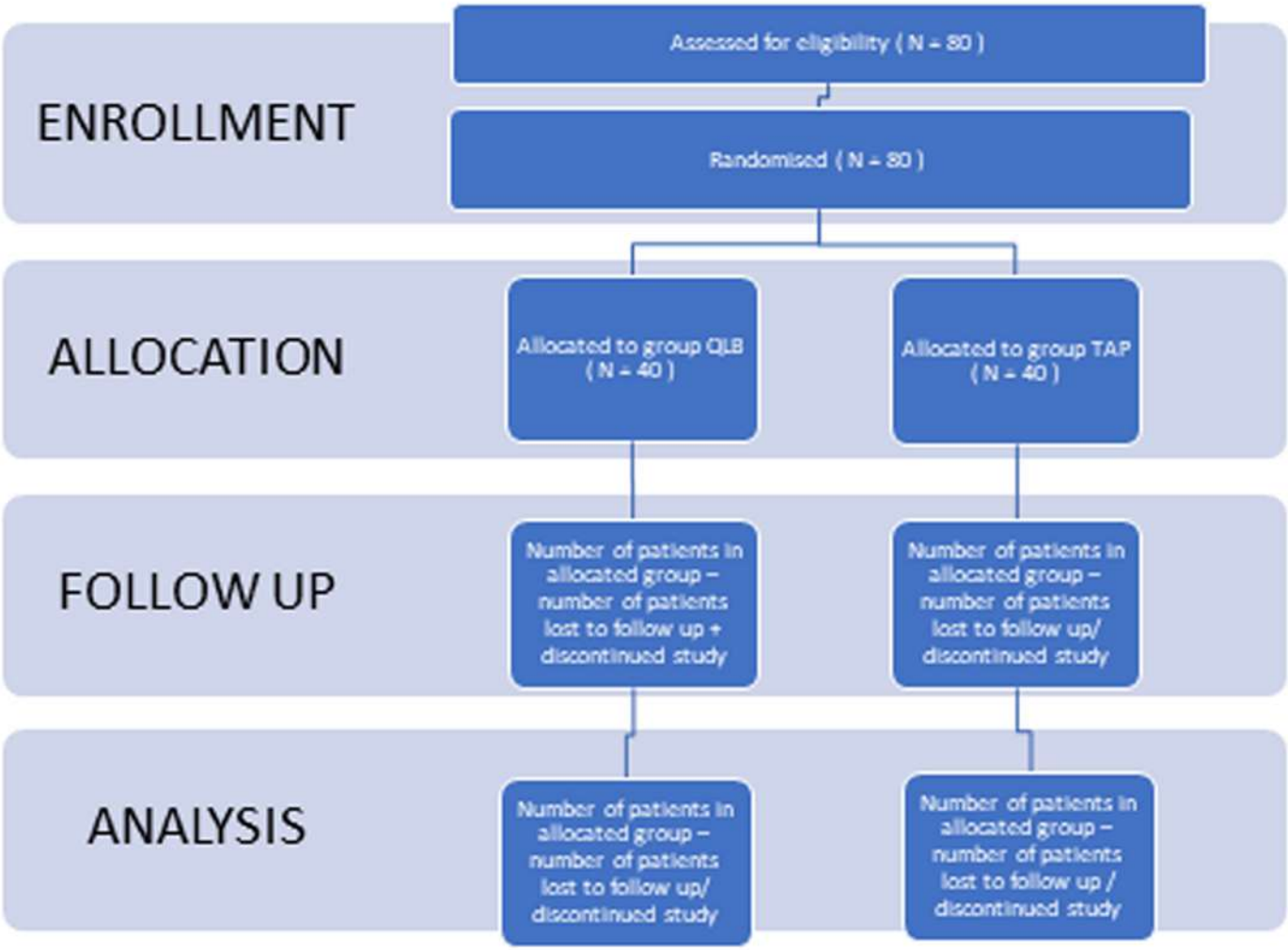


TABLE 1 ; Comparison of Cumulative Tramadol Consumption between Groups

	Number of doses of intravenous tramadol 100 mg		
Tramadol Consumption	**Group 1(N = 40)**	**Group 2(N = 40)**	**p – value**
1 Hour	0.00 ± 0.00	0.00 ± 0.00	1.000^{NS}
2 Hours	0.00 ± 0.00	0.00 ± 0.00	1.000^{NS}
4 Hours	0.03 ± 0.16	0.03 ± 0.16	1.000^{NS}
6 Hours	0.05 ± 0.22	0.18 ± 0.38	0.079^{NS}
12 Hours	0.08 ± 0.35	0.68 ± 0.53	0.001^{S}
24 Hours	0.30 ± 0.72	1.80 ± 0.56	0.001^{S}

Mann-Whitney test was performed.

S Difference is significant at 0.05 level.

NS Difference is not significant.

Group 1 – quadratus lumborum type II block (QLB) group

Group 2 – transversus abdominis plane (TAP) block group

FIGURE 2 ; - Line diagram comparing cumulative tramadol consumption between groups

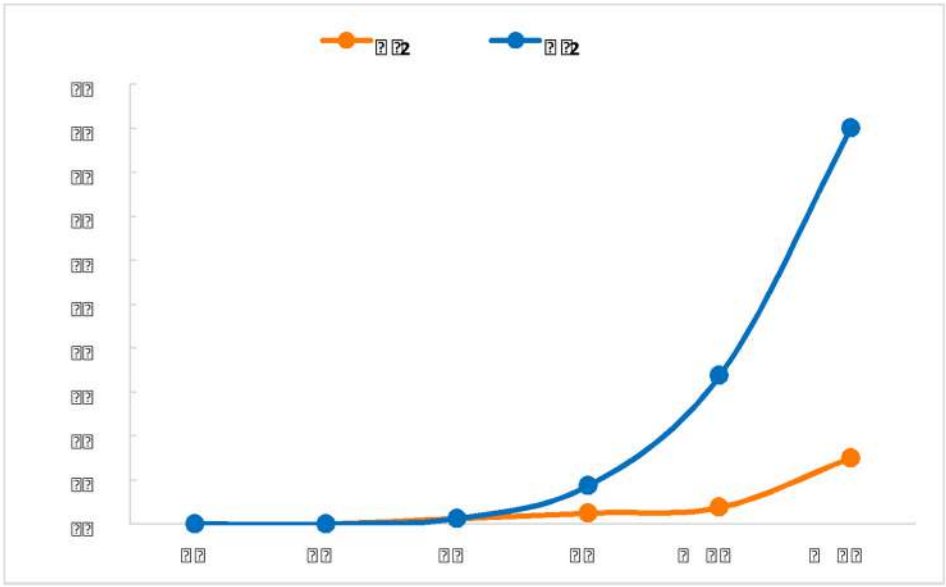


TABLE 2 ; Comparison of Numerical Pain Rating Scale (NRS) score between Groups

Numerical Pain Rating Scale (score)	Group 1(N = 40)	Group 2 (N = 40)	p – value
0 Hours	0.00 ± 0.00	0.00 ± 0.00	1.000^{NS}
1 Hour	1.20 ± 1.49	2.55 ± 1.08	0.001^{S}
2 Hours	2.08 ± 1.47	3.05 ± 0.22	0.001^{S}
4 Hours	2.70 ± 1.09	3.28 ± 0.51	0.002^{S}
6 Hours	2.95 ± 0.99	3.80 ± 0.72	0.001^{S}
12 Hours	3.10 ± 0.96	4.83 ± 0.55	0.001^{S}
24 Hours	3.23 ± 1.07	5.18 ± 0.50	0.001^{S}

Mann-Whi... test was performed.

S Difference is significant at 0.05 level.

NS Difference is not significant.

Group 1 – quadratus lumborum type II block (QLB) group

Group 2 – transversus abdominis plane (TAP) block group

FIGURE 3; Line diagram comparing Numerical Pain Rating Scale between groups

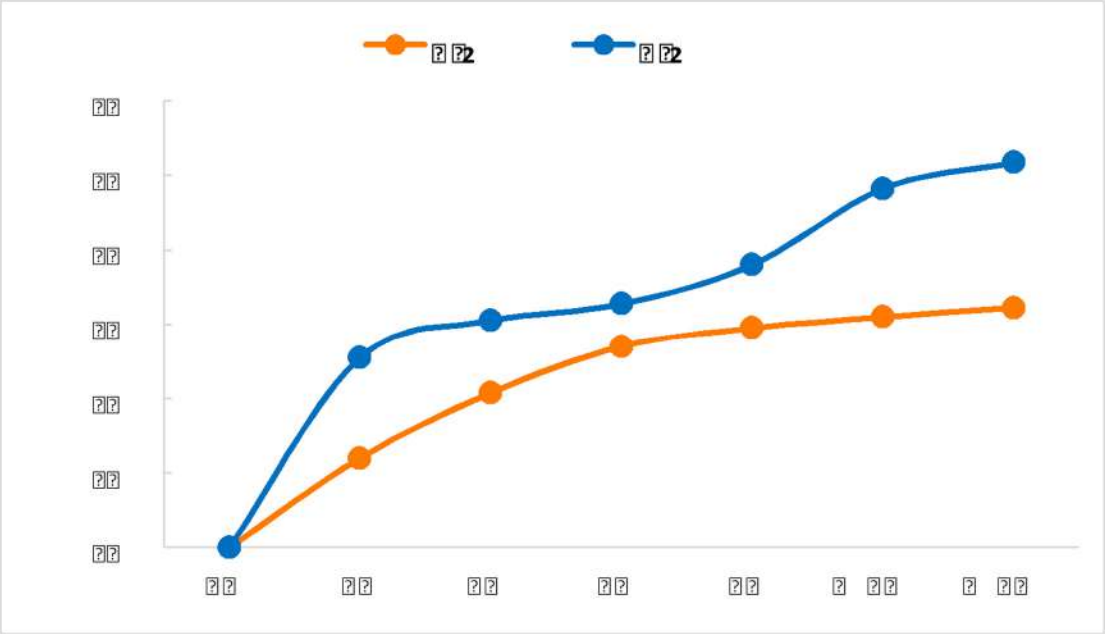


TABLE 3; Comparison of Duration of Postoperative Analgesia between Groups

	Duration in hours		
Group	**Mean**	**SD**	**p – value**
Group 1(N = 40)	21.80	5.988	0.001
Group 2(N = 40)	12.85	5.763	

Mann-Whitney test was performed.
Group 1 – quadratus lumborum type II block (QLB) group
Group 2 – transversus abdominis plane (TAP) block group

FIGURE 4; Bar Graph comparing duration of post-operative analgesia between groups

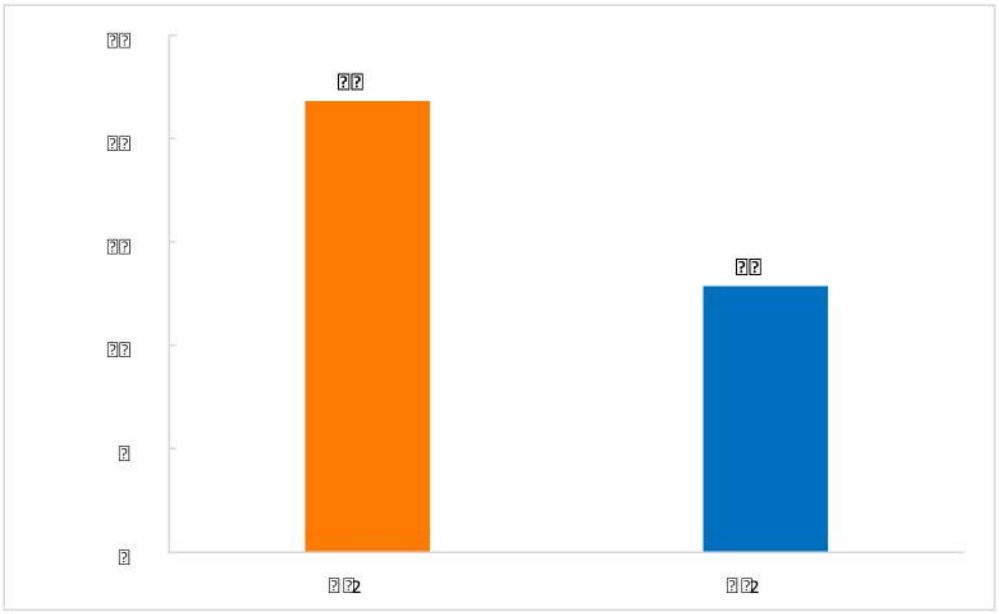


FIGURE 5; Bar graph comparing cumulative supplemental analgesia between groups

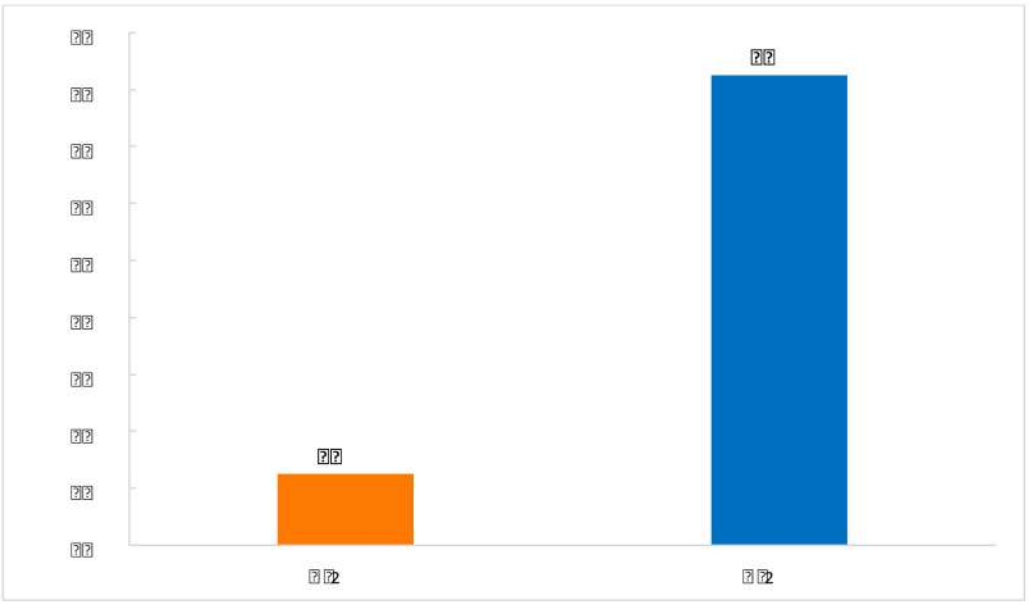
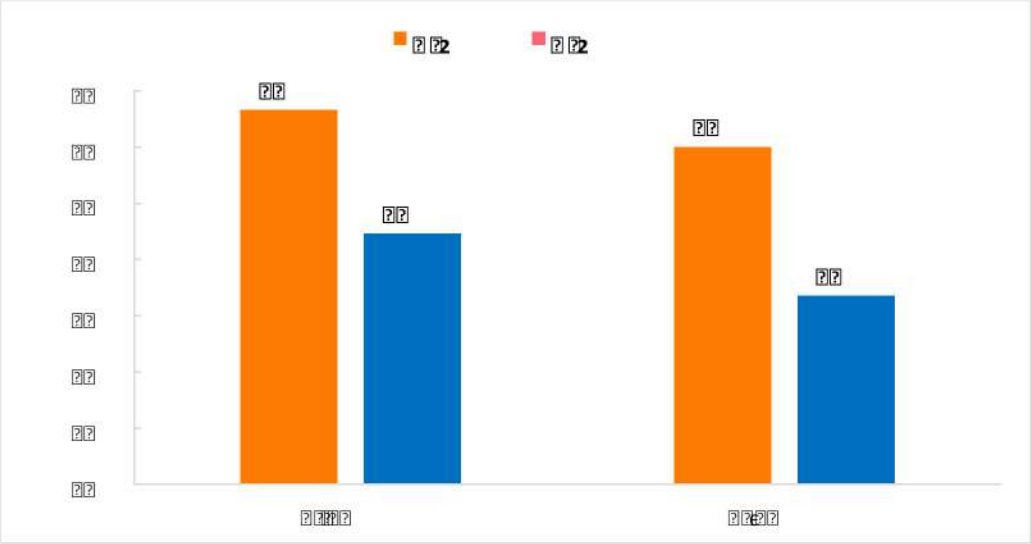


TABLE 4 ; Comparison of Sensory Dermatomal Spread between Groups

	Number of dermatomes involved above the level of T10		
Group	**Mean**	**SD**	**p – value**
Sensory Dermatomal Spread at 6 hours			
Group 1(N = 40)	3.325	0.616	0.001
Group 2(N = 40)	2.225	0.480	
Sensory Dermatomal Spread at 12 hours			
Group 1(N = 40)	3.000	0.599	0.001
Group 2(N = 40)	1.675	0.572	

FIGURE 6; Bar chart comparing the sensory dermatomal spread between groups



CASE REPORT

A race against time: The unforeseen embolic event.

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ABSTRACT

Pulmonary embolism (PE) is a life-threatening event that may occur even in individuals with negligible or absent risk factors [1]. PE is typically linked with surgeries of long duration, prolonged immobilization, obesity, patient with h/o malignancy and on treatment for malignancy, thrombophilic disorders . There are reports of pulmonary embolism occurring in individuals with low-risk , suddenly in the preop and post op period with dramatic symptoms. This report describes two postoperative cases of PE linked to unusual factors which require extensive research.

Keywords: Pulmonary embolism, COVID, Ayurvedic medications

Case 1

A 43-year-old woman (BMI 20), ASA class 1 , no history of abortions or surgeries in the past ,no h/o malignancies or bleeding /clotting disorders in the family and normal systemic examination underwent right ureterorenoscopy and DJ stenting under spinal anesthesia. The 20-minute procedure was uneventful and she remained stable for several hours postoperatively. She was shifted out to the ward the same evening. The next morning, soon after breakfast, she suddenly developed dizziness, a brief seizure and cardiovascular collapse in the ward. Examination by the rapid response team revealed hypotension, tachycardia, tachypnea, and hypoxia as evidenced by transport pulse oximeter (85%). %). She was shifted to the ICU with Oxygen support via AMBU. Glasgow Coma Scale was 8. She was intubated and treated with intravenous fluids, vasopressors and antiepileptics. We suspected aspiration but chest was clear throughout. ECG showed new-onset atrial fibrillation followed by S1Q3T3 in the serial ECG.ABG analysis revealed metabolic acidosis with elevated lactate. Echocardiography demonstrated right atrial and ventricular dilatation with an ejection fraction of 30% suggesting acute PE. D-dimer levels were markedly raised (61,053 ng/mL) and Troponin I was 329 ng/L. Because of hemodynamic instability CT pulmonary angiography (CTPA) was deferred. Immediate thrombolysis was initiated with ongoing CPR resulting in rapid hemodynamic recovery in 4 hours. Post -stabilization CTPA confirmed residual thrombi in the bilateral basal pulmonary arteries. She was discharged on oral anticoagulants (Apixaban) with stable haemodynamic and neurological parameters and asked to review in cardiology OP after 6 weeks. Retrospective review revealed two proved episodes of COVID-19 infection followed by lower respiratory tract infection one month back which was not tested for Covid and ongoing use of Ayurvedic medicine for renal calculi until the day before surgery.

Case 2

A 30-year-old man, ASA class 1 with mandibular and maxillary fractures secondary to a road-traffic accident underwent open reduction and internal fixation of mandibular fracture under general anesthesia with endotracheal intubation. He had no relevant medical or family history. Intra- and postoperative courses were uneventful. DVT prophylaxis with pneumatic pump was ensured and ambulated early postoperatively.

On postoperative day seven, he experienced sudden seizure and cardiorespiratory arrest in the ward. CPR was initiated and return of spontaneous circulation was achieved after two cycles. He was intubated and transferred to the ICU. ECG findings were consistent with PE (S1Q3T3). Echocardiography demonstrated severe right-sided chamber dilatation and dysfunction with a suspected thrombus in the left pulmonary artery. D-dimer exceeded 25,000 ng/mL. Bilateral Venous Doppler confirmed deep vein thrombosis in the right leg. He was haemodynamically stable without Vasopressors. CTPA revealed a massive PE involving the left main pulmonary artery extending into lobar branches as well as thrombi in the right pulmonary branches. The patient underwent immediate thrombolysis followed by anticoagulation with low-molecular-weight heparin 0.6ml S/C twice daily for 3 days. He developed minor bleeding at the surgical site which subsided by its own but no intracranial hemorrhage as evidenced by CT Brain. He was extubated on day 4 and started on Dabigatran 110 mg twice daily and advised to review in cardiac OP after 6 weeks and discharged on T. Digoxin, T. Dabigatran and T. Levetiracetam. Review of history revealed occasional smoking, a recent respiratory infection within 1 month not tested for COVID and the use of Ayurvedic medication for low back pain for the past six months.

Discussion

These cases underscore that pulmonary embolism can occur in patients categorized as low-risk (Caprini score < 2) and in patients categorized as low-risk (Caprini score < 2) and in patients categorized as high risk (Caprini score >2) [3]. Both individuals exhibited multiple factors that may have contributed to a prothrombotic milieu: dehydration, recent respiratory infections (possibly post-COVID) and herbal medication use[4]. Dehydration leads to hemoconcentration and venous stasis; subclinical infections can induce injury to the endothelium causing disturbance to the endothelium and cytokine release causing hypercoagulability [4]. Ayurvedic formulations in food, water and industrial products which contain heavy metals like mercury , lead, cadmium, arsenic and chromium cause damage to the vascular endothelium resulting in activation of coagulation. [5]. Together, these conditions can amplify thrombosis risk, particularly in the post-COVID era marked by persistent inflammatory and vascular sequelae [6]. Both case 1 and case 2 had a Wells score for PE of <2 (1.5) – only tachycardia[7] still they developed PE, case 1 within 24 hours of surgery and case 2 on the 7th postop day. The only common factors in both these cases was history suggestive of covid infection and history of Ayurvedic drug intake for more than1 month, this instigates us to look into other factors especially in the Indian population where Ayurvedic medication is very popular for aches, pains and renal stones.

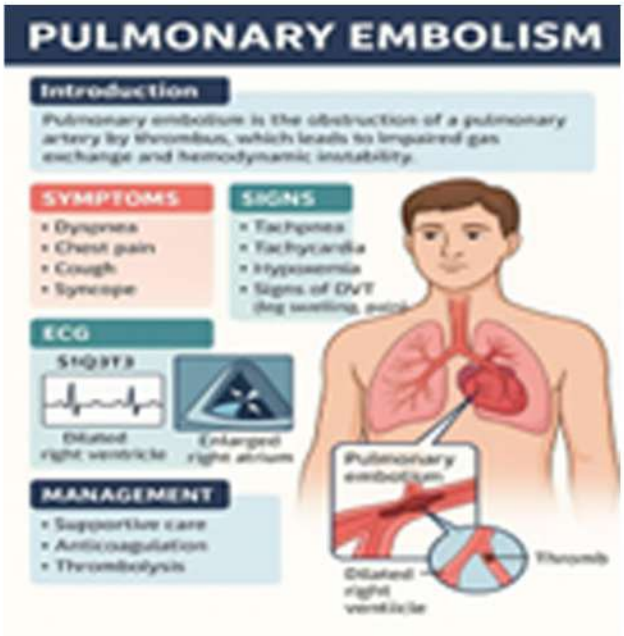

Fig 1. [2]

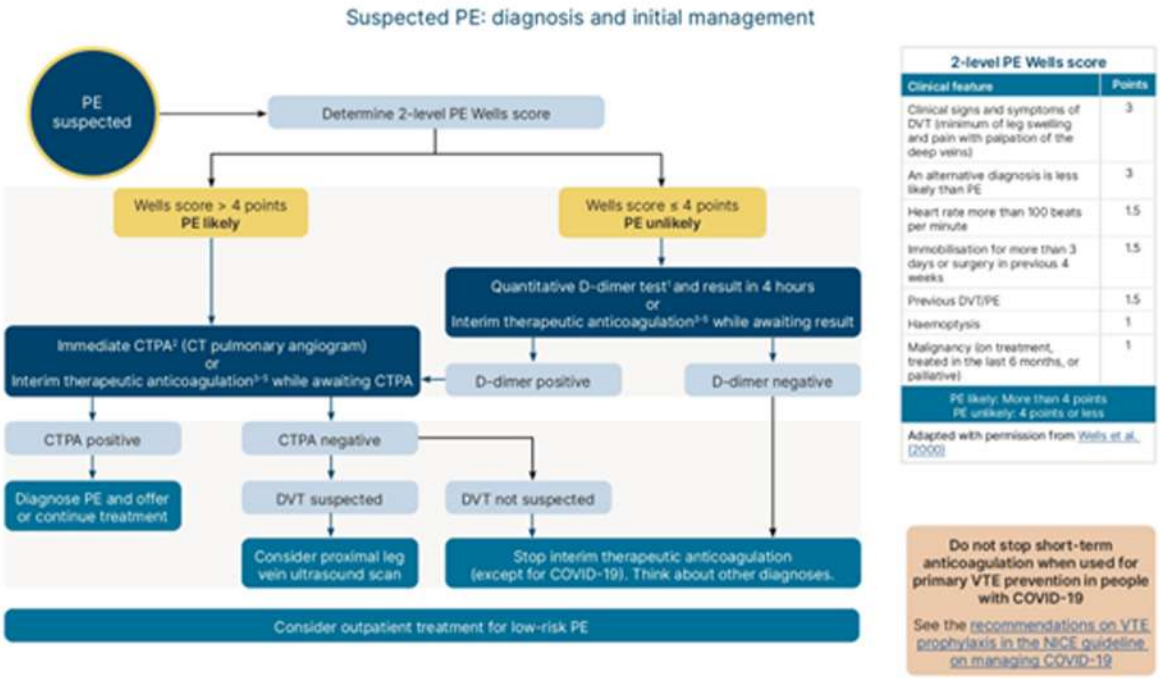

fig2[7a]

DVT or PE: anticoagulation

- Measure baseline full blood count, renal and hepatic function, PT and APTT but start anticoagulation before results available. Review and if necessary act on results within 24 hours
- Offer anticoagulation for at least 3 months. Take into account contraindications, comorbidities and the person's preferences
- After 3 months (3 to 6 months for active cancer) assess and discuss the benefits and risks of continuing, stopping or changing the anticoagulant with the person. See long-term anticoagulation for secondary prevention in the guideline

No renal impairment, active cancer, antiphospholipid syndrome or haemodynamic instability	**Renal impairment** (CrCl estimated using the Cockcroft and Gault formula; see the BNF)	**Active cancer** (receiving antimitotic treatment, diagnosed in past 6 months, recurrent, metastatic or inoperable)	**Antiphospholipid syndrome** (triple positive, established diagnosis)
Offer apixaban or rivaroxaban If neither suitable, offer one of: • LMWH for at least 5 days followed by dabigatran or edoxaban • LMWH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone	CrCl 15 to 50 ml/min, offer one of: • apixaban • rivaroxaban • LMWH for at least 5 days then – edoxaban **or** – dabigatran if CrCl ≥ 30 ml/min • LMWH or UFH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone CrCl < 15 ml/min, offer one of: • LMWH • UFH • LMWH or UFH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone	Consider a DOAC If a DOAC is not suitable, consider one of: • LMWH • LMWH and a VKA for at least 5 days or until INR at least 2.0 on 2 consecutive readings, then a VKA alone Offer anticoagulation for 3 to 6 months Take into account tumour site, drug interactions including cancer drugs, and bleeding risk	Offer LMWH and a VKA for at least 5 days or until INR at least 2.0 on 2 consecutive readings, then a VKA alone

fig.3[7b]

In patients with PE accompanied with haemodynamic instability - unfractionated heparin infusion with thrombolytic therapy is adviced. For extremes of body weight less than 50kg or more than 120kg anticoagulation should be continued considering safety and therapeutic profile. Monitoring INR is not routinely recommended [fig3][7]

As per the NICE guidelines the first patient was managed with Apixaban for six weeks and asked to review and probably will have it extended to 3 months as there was prior proved COVID infection. The second patient was prescribed Dabigatran 110 mg twice daily for six weeks and maybe continued for 3 to 6 months since there is extensive thrombosis in right leg. If no recurrence, both will be stopped at 3 months. Both cases were advised to refrain from usage of any type of Ayurvedic drugs. Case 2 was referred to our vascular surgeon because patient was young and for benefit of IVC filters but since he was hemodynamically stable throughout, it was not put.

Both these cases show evidence of an association of covid and ayurvedic drug intake with pulmonary embolism which requires further research, hence the reporting.

CONCLUSION

Pulmonary embolism can present as a catastrophic event which can mask other conditions. Presentations range from mild dyspnea to sudden cardiovascular collapse. These cases emphasize the importance of maintaining clinical vigilance even after minor procedures, rapid recognition and resuscitation and incorporating individualized factors—such as hydration status, recent respiratory infections like COVID and use of alternative medicines—into perioperative risk assessment. In the evolving post-pandemic landscape, sustained awareness is vital to prevent unexpected thromboembolic outcomes.

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CONFLICT OF INTEREST

Nil

AUTHORSHIP DECLARATION

We, hereby declare that this manuscript has not been published before or presented at any conference .

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1st Nov 2025

CASE REPORT

Anaesthetic Challenges in Neuronal Ceroid lipofuscinoses for Percutaneous Endoscopic Gastrostomy

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Neuronal ceroid lipofuscinoses are rare inherited lysosomal storage diseases with multisystem involvement. Here we describe the anesthetic management of a six-year-old female patient who presented with recurrent aspiration pneumonia, multidrug resistant seizures, progressive deterioration of milestones. She was mute with impaired vision and was posted for Percutaneous Endoscopic Gastrostomy. Presence of uncontrolled seizures, difficulty in communication, cognitive impairment, predisposition to bradycardia, hypothermia, risk of aspiration with persistent lung infection were few of the challenges we faced. Optimization of seizure therapy, antibiotics, chest physiotherapy, nebulization with broncho dilators helped in preoperative preparation. Use of glycopyrrolate helped prevent bradycardia and reduce secretions. Propofol and midazolam for induction of anaesthesia helped prevent seizures during the procedure which was done under intravenous sedation with monitored anaesthesia care. Patient was positioned slight head up to prevent aspiration and we were ready to intubate if necessary. Warmers and warm fluids helped prevent hypothermia. The procedure was completed uneventfully.

Introduction

Neuronal ceroid lipofuscinoses (NCL) are a group of autosomal recessive inherited neurodegenerative diseases characterized by accumulation of lipofuscin in tissues. [1] Clinical manifestations are progressive mental and motor deterioration, multidrug resistant seizures, visual loss, cardiac involvement with intra operative arrhythmias (bradycardias) and hypothermia.[2] We report the anaesthetic

challenges in managing a six-year-old female child with NCL for percutaneous endoscopic gastrostomy (PEG).

Case report

Six-year-old female child, (weight 18.7kg) presented with recurrent aspiration and pneumonia. She was diagnosed as a case of NCL 7 at 5 years by genetic study. She was the second child of 3rd degree consanguineous parentage was delivered by LSCS with a birthweight of 2.4kg. The child was apparently normal till 3 years of age when she developed abnormal movements in the form of drop attacks, progressive deterioration of all her attained mile stones and recurrent aspiration pneumonia. From the past one year she was bed ridden, mute with impaired vision with no fixing or following. She was admitted to our hospital following aspiration pneumonia with desaturation (SpO2 85%) and was started on high flow nasal canula (HFNC). Chest x ray showed multiple opacities on right side suggestive of aspiration. She had pooling of secretions following feeds and required intermittent suctioning. Pediatric neurology consultation was done in view increased dystonic movements. Her clobazam dose was increased from 0.5mg/kg/day to 1mg/kg/day and Sodium Valproate was continued at 20 mg/kg/day. The child was started on nebulizations with salbutamol sulphate and ipratropium bromide and budesonide, intermittent suctioning, physiotherapy and antibiotics. She was weaned off HFNC to O 2 via pediatric face mask at 5l/min. multidisciplinary team meeting was conducted and the parents' concerns were addressed. They were advised trial of percutaneous endoscopic gastrostomy (PEG) as a supportive measure for feeding. The plan was PEG under monitored anesthesia care with intravenous sedation after taking a high-risk consent. All the regular medications were continued in the morning. She had crepitations, more on the right side. O2 2-3l/min was administered with nasal prongs; patient was positioned supine with head turned to the left side and slight reverse Trendelenburg position 15 degree was given. Electrocardiogram, SpO2, noninvasive blood pressure, temperature monitoring was done. Patient was given glycol -pyrrolate 0.1mg, fentanyl 20mcg, midazolam 0.25mg and propofol 10mg. We had to repeat dose of propofol 5mg twice to maintain the depth of anaesthesia, PEG tube insertion was done after infiltration of puncture site with 5ml bupivacaine 0.2% infiltration. Warmed plasmalyte with 2% dextrose was given at the rate of 60 ml/hr. Hot air warming blankets helped in maintaining the temperature. After the procedure was completed uneventfully, she was shifted to pediatric intensive care unit for monitoring. The mother was taught how to suction, give PEG feeds and do physiotherapy The child was discharged on the 7th post procedure day.

Discussion

NCL is associated with progressive multiorgan dysfunction. Loss of airway tone with drooling of saliva, lower oesophageal sphincter dysfunction, repeated aspiration pneumonia, ongoing dystonia, chance of prolonged ventilation and failure to wean called for proper planning for anesthesia. [1]
Adequate control of respiratory infection and dystonia was one of the first steps towards this goal. Lack of communication with poor muscle tone rendered incentive spirometry impossible. [1,2]

Even though this patient had a risk of aspiration, we avoided intubation as there is a possibility of prolonged ventilation with attended problems. It was a short procedure which normally does not call for endotracheal intubation. [3,4] A slight head up position of 15 degree was used to avoid regurgitation. We were ready to intubate the patient in the event of respiratory compromise. Glycopyrrolate reduced secretion. Use of intermittent propofol also helped in maintain the depth of anesthesia at the time of introduction of endoscope and helped in the early recovery of this patient with hypotonia.[2] Propofol and midazolam with its antiepileptic action helped in preventing triggering a seizure. The use of local anesthesia at the site of incision helped achieve adequate analgesia.[1]

Since they are prone to hypothermia, proper warming blankets, warm fluids helped maintain

temperature for this very short procedure(20min). [2] Bradycardia was avoided by avoiding drugs causing bradycardia like dexmedetomidine and also by giving glycopyrrolate.

CONCLUSION

NCL due to multisystem involvement and rarity present a challenge to the anesthesiologist. Meticulous preoperative preparation, awareness of anticipated complications can help in proper management.

Keywords: Neuronal ceroid lipofuscinoses disease, Gastrostomy, Children, Endoscopy

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