

Postoperative Analgesic Effectiveness of Ultrasound Guided Transversus Abdominis Plane Block in Patients with C section

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ABSTRACT

Aim: To observe the analgesic effect of transversus abdominis plane (TAP) block in patients with caesarean section postoperatively

Study design: Randomized controlled trial.

Place and duration of study: Department of Anesthesia, Bhatti International Hospital affiliated with the Central Park Medical College & Hospital, Lahore from 1st July 2019 to 31st December 2019.

Methodology: Fifty four patients were studied undergoing caesarean section under spinal or general anesthesia were randomized to undergo TAP block with bupivacaine (n=27) and controlled group (n=27) with normal saline. The standard analgesia was intravenous paracetamol and nalbuphine. At the end of the surgery, ultrasound guided TAP block was given bilaterally using bupivacaine or normal saline 10ml on either side. Pain intensity were observed using verbal rating score (VRS) and Visual analogue scale (VAS, 0= no pain vs 10 severe pain) at 2, 4, 6, 8, 10, 12 and 24 hours postoperatively in both groups.

Results: Patients received ultrasound guided TAP block showed less pain and more comfortable as compared to the other group received intravenous analgesic drugs. Mean requirement of intravenous analgesic drugs was reduced in the first 24 hour in study group.

Conclusion: Ultrasound guided TAP block in patients after cesarean section reduces pain and requirement of opioids and other analgesic drugs in first 24 hours.

Keywords: Transversus abdominis plane block, Cesarean section, Bupivacaine, Nalbuphine

INTRODUCTION

Postoperative pain relief is a major goal of an anesthesiologist. This pain is categorized as an acute pain and is defined as pain present in a surgical patient after a procedure.¹ Poorly managed postoperative pain can lead to a lot of complications including increased morbidity, impaired physical function and quality of life, prolonged use of opioids and other analgesic drugs in hospital and at home, increase chances of chronic pain, prolong hospital stay, poor satisfaction of patient and increase cost of care.² Adequate pain relief leads to less chance of complications, shortened hospital stay, reduces hospital cost and increased patient satisfaction. There are a lot of modalities to overcome the postoperative pain including spinal or epidural analgesia, opioid or non-opioid analgesia, patient control analgesia, local infiltration and peripheral nerve block^{3,4}.

Transversus abdominis plane block is a local anesthetic technique for analgesia of the anterolateral abdominal wall first introduced by Rafi⁴ in 2001. A field block, involves a deposition of local anesthetic drug in the plane between the internal oblique and transversus abdominis muscle to target the nerves passing through them. Ultrasound guidance is now a gold standard reduces requirement of total local anesthetic drugs and other analgesic drugs and provides effective and adequate analgesia⁵.

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MATERIALS AND METHODS

This randomized controlled trial study was conducted Department of Anesthesia, Bhatti International Hospital affiliated with the Central Park Medical College & Hospital, Lahore from 1st July 2019 to 31st December 2019. Fifty four obstetric patients with an American Society of Anesthesiologist (ASA) physical status II or III, age between 20 and 40 years, posted for elective or emergency caesarean section were included. Patients with known allergic to any study drugs, hepatic or renal disease, morbidly obese, any bleeding disorder, opioid addicted, non cooperative, and those who refused to participate in this study were excluded. The patients were divided in two groups; Group 1 was containing the patients receiving ultrasound guided TAP block with 0.25% bupivacaine 10ml on each side as group B and group II received normal saline in same amount. The anesthesiologist and all other postoperative care providers were unaware to the study group. According to our departmental policy, preanesthesia assessment done and explained preoperatively about the pain and scoring system. The elective patients were fasted for 8 hours and the emergent as per possibility. All patients were premedicated with ondansetron 4mg IV and sodium citrate 30mls 0.3M orally 30 min before operation to prevent intra and postoperative nausea and vomiting and pulmonary aspiration. No matter, the patient received either spinal anesthesia with 27G spinal needle (used hyperbaric bupivacaine 0.75% 10 to 12mg) or general anesthesia with rapid sequence induction and intubated with endotracheal tube size 7 ID. All standard monitors were applied including

pulse oximeter, non-invasive blood pressure (NIBP), ECG, end tidal CO₂ and temperature monitor in patients with general anesthesia. The patients received GA were given nalbuphine 10mg after delivery of fetus and paracetamol 1gm IV. While the patients received SA were given Midazolam 2mg intraoperatively. At the end of the surgery, US guided TAP block was performed using aseptic measures bilaterally. The drug was given by one of the investigator who don't know about the study drug, using either bupivacaine 0.25%, 10ml or normal saline 10ml on each side. After preparing the skin with alcoholic solution, a linear high frequency US probe 6-12 MHz sonosite was placed transversely between the costal margin and iliac crest in the midaxillary line. The structures were identified as the three layers of muscle," external oblique, the internal oblique and the transversus abdominis. A 21G needle attached with a syringe through a tubing and introduced through the skin anteriorly in the plane of the ultrasound beam and advanced into the facial plane between the internal oblique and the transversus abdominis muscle. After negative aspiration of blood or other any fluid, the study drug was injected on both sides and observed the patient for local anesthetic toxicity or allergic reaction. The patients shifted in post anesthesia care unit(PACU), applied necessary monitoring like ECG, NIBP, and pulse oximeter immediately postoperatively. Pain intensity was observed using verbal rating score (VRS) and VAS (0= no pain, 10= severe pain) at 0, 2, 4, 6, 8, 10, 12 and 24 hours. If the pain was mild or VAS<4, the patient was counseled to tolerate the mild pain but when the pain was moderate to severe or VAS >4, the patient treated with Paracetamol 1g IV or nalbuphine 2mg IV initially and increased according to requirement. The patient was also observed post operative complications like nausea and vomiting, itching, sedation or respiratory depression. The duration of TAP block analgesia and the total opioid drug consumption was calculated and the patient satisfaction was observed. The data was entered and analyzed through SPSS-20. Student's t was applied, P value <0.05 was considered as statistically significant.

RESULTS

The mean age of patients in group I and II was 28.52±3.66 years and 29.05±3.18 years. In group I mean BMI was 23.48±2.86 kg/m² and in group II it was 23.01±2.44 kg/m². No significant difference was observed regarding age and body mass index between both groups with p value >0.05 (Table 1).

No significant difference was observed in term of pain score between both groups at 2, 4, and at 6 hours p-value >0.05. At 8 hours mean pain score in group I patients was 2.54±1.36 and in group II it was 3.84±1.63, a significant difference was observed with p-value 0.02. At 12 and at 24 hours no significant difference was observed between both groups regarding mean pain score with p-value >0.05 (Table 2).

Time to first analgesic administration (tramadol) was prolonged significantly in Group I Mean 8.75±1.8 hours as compared to Group II mean 3.76±1.74 (p=0.001 [Table 3]

Table 1: Comparison age and body mass index

Variable	Group I	Group II	P-value
Age (years)	28.52±3.66	29.05±3.18	0.09
BMI (kg/m ²)	23.48±2.86	23.01±2.44	0.1

Table 2: Pain score at different intervals of time between both groups

Interval time	Group I	Group II	P-value
At 2 hours	6.02±2.6	6.24±2.8	N/S
At 4 hours	5.25±2.4	5.2±2.3	N/S
At 8 Hours	2.54±1.36	3.84±1.63	0.02
At 12 Hours	0.25±0.1	0.38±0.1	N/S
At 24 Hours	2.82±1.1	2.76±0.8	N/S

Table 3: Time for rescue analgesia

Mean Time (hours)	Group I	Group II	P value
	8.75±1.8	3.76±1.74	0.001

DISCUSSION

Acute pain is the major problem after surgery especially in the first 24 hours. Most of the surgical patients spend their immediate postoperative period in the PACU where pain management affects further recovery. Lower segment cesarean section is a major procedure and postoperative analgesia is challenging due to severe pain. There are a lot of recent advances in modalities for postoperative analgesia after c section. Intrathecal and epidural opioids provide a good analgesia but they are associated with various side effects like postoperative nausea vomiting and pruritus which decrease patient satisfaction⁶ and risk of delayed respiratory depression due to rostral spread and systemic absorption of opioids like morphine.⁷ Patient control IV analgesia is also a good option used for postoperative analgesia in c section but associated with deep sedation and respiratory depression.⁸ Non-steroidal anti-inflammatory drugs and acetaminophen either in the form of IV, oral or per rectal are also used but are associated with complications like gastrointestinal upset and bleeding, uterine atony, bleeding tendencies and poor patient satisfaction.^{9,10} Wound infiltration technique with local anesthetic or non steroidal anti-inflammatory drug mixture is using constantly but are associated with wound infection, wound erythema and hematoma¹¹.

The transversus abdominis plane block is a good option for post operative pain management in c section and is using worldwide successfully. The anterior abdominal wall is innervated by T7-T12, intercostal nerves, ilioinguinal and iliohypogastric nerves, and the lateral cutaneous branches of the dorsal rami L1-L3.¹² TAP block is a regional technique and has gained popularity in intra and postoperative pain management for abdominal surgeries like c section, laparotomies¹³, laparoscopic and open appendectomy¹⁴, cholecystectomy¹⁵, total abdominal hysterectomy¹⁶, inguinal and abdominal hernia repair etc. Ultrasound guided TAP block was introduced in 2007 by Hebbard et al¹⁷ and gained popularity soon with low frequency of adverse effects.¹⁸ Ultrasound guided TAP block provides a most effective and longest lasting analgesia for 11–24 hours by some authors in postoperative period among patients undergoing c section^{19,20}.

In the present study, we found that USG guided TAP block reduces postoperative pain score, reduces the total dose of opioids and other analgesic drugs. Some previous studies demonstrated that USG-guided TAP block using 20 ml ropivacaine was effective on both sides for postoperative pain management in patients undergoing cesarean section.²¹ But in this study the local anesthetic concentration was low and added 1g Apotel intravenously every 8 hourly within 15 minutes and 25mg mepridine intravenously when the VAS >3. There is another study where TAP block was performed using anatomical landmarks for better postoperative analgesia in lower abdominal surgery⁴, but using this method there was a higher chance of complications like nerve damage and intraperitoneal penetration and organ injury. There was another study in which TAP block was compared with intrathecal morphine for postoperative analgesia in cesarean section, it was noted that the superior analgesia was achieved with intrathecal morphine as compared to TAP block but at the expense of side effects^{22,23}.

Although the USG-guided TAP block is a safest method but some cases of complications have been reported in the literature.^{24,25} Physiological changes in pregnancy can predispose to local anesthetic toxicity. The factors in pregnant patients like reduced calculated dose of local anesthetic drug that can cause convulsions²⁶, increase concentration of free drug available due to decrease protein binding, increased venous distension of inferior vena cava and an increase in cardiac output leading to increase uptake and distribution of the drug^{27,28} and an increase in neuronal susceptibility to local anesthetic itself can predispose to local anesthetic toxicity. There is one previous published case of convulsions occurring 3 hours after a TAP block and managed successfully in a patient that had a laparoscopy assisted myomectomy.²⁹ There is an increased chance of local anesthetic toxicity when concomitantly using the subarachnoid block for cesarean section with the same drug due to vasodilation induced by sympathetic block.

CONCLUSION

Ultrasound guided TAP block in patients with cesarean section postoperatively reduces pain, prolongs the time for first analgesic requirement, decreases total consumption of opioids and other analgesic drugs, reduces chance of postoperative complication and prolongs hospital stay, facilitates early ambulation and discharge from the hospital, so decreases financial burden.

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