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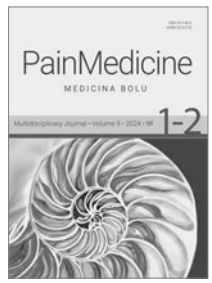

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Use of Transverse Abdominis Block for Post Operative Pain Management in Patients Undergoing Emergency Cesarean Sections: a Prospective Study

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Abstract

Introduction. *Postoperative pain management is an essential aspect of perioperative care for patients undergoing emergency Cesarean sections. Adequate pain control not only improves patient comfort and satisfaction but also facilitates early mobilization, reduces the risk of complications, and shortens hospital stays. Transverse abdominis plane (TAP) block is a well-established technique for providing analgesia to the anterior abdominal wall, which can significantly reduce postoperative pain. In recent years, ultrasound guidance has been increasingly used to improve the accuracy and safety of TAP block. This research article aims to review the use of ultrasound-guided TAP block for postoperative analgesia in patients undergoing emergency Cesarean Sections.*

Methodology: A total of 60 patients who underwent Emergency Cesarean Sections were included in the study. All received bilateral US-guided TAP blocks with either ropivacaine 0.5 % 20 ml on each side i. e. 40 ml total or saline. All participants received a spinal anaesthetic with bupivacaine, followed by postoperative acetaminophen, non-steroidal anti-inflammatory drugs, and patient-controlled i.v. tramadol. Each patient was assessed 24 h after delivery for PCA Tramadol usage, average pain score, nausea, vomiting, itch and duration of hospital stay.

Results and Conclusion Out of the total 60 patients, 30 were in the study group and 30 in placebo group. Total PCA Tramadol use in 24 h was reduced in the study group compared with the placebo group ($P < 0.05$). The active group reported improved satisfaction with their pain relief measured by visual analogue scale as compared with the placebo group ($P = 0.008$). There were no local complications attributable to the TAP block.

Transverse abdominis plane block was effective in providing analgesia with a substantial reduction in tramadol use during 24 h after cesarean section when used as adjunctive to standard analgesia.

Keywords: *TAP Block, Cesarean section, transverse abdominis plane block, ropivacaine*

Manuscript

Use of Transverse Abdominis block for Post Operative pain management in Patients undergoing Emergency Cesarean Sections: a prospective study.

Background

Inadequate analgesia in a post partum female increases the risk of multiple morbidities like deep vein thrombosis, throboembolism, delayed breast feeding etc. As part of a multimodal analgesic regimen, opioids are required initially to achieve effective analgesia. However, opioids are associated with dose-dependent side-effects including nausea, vomiting, pruritus, sedation, and respiratory depression. Moreover, excess use of Opiods is also undesirable for the patient as well as breastfed newborn.

TAP block is a regional anesthesia technique that involves injecting local anesthetics into the fascial plane between the internal oblique and transverse abdominis muscles, which innervate the anterior abdominal wall. The TAP block can provide effective analgesia for a variety of surgical procedures, including hernia repair, exploratory laparotomy, cesarean section, and laparoscopic surgery[1–5]. Several studies have demonstrated the efficacy and safety of TAP block for postoperative analgesia in elective and non-elective abdominal surgeries[1–5].

Ultrasound guidance has been shown to improve the accuracy and safety of TAP block by allowing real-time visualization of the needle tip and surrounding structures[6].

McDonnell and colleagues demonstrated that the transverse abdominis plane (TAP) block reduces OPIOD use after abdominal surgery, including Caesarean delivery[7]. The block described is a landmark-guided technique. It requires the detection of two pops, or loss of resistance, using a short-bevel needle to locate the facial layer between the internal oblique and the transverse abdominis muscles. Injection of local anaesthetic into this plane can anaesthetize the lower abdominal wall. However, this technique is blind and requires higher volumes of drugs as compared to USG guided technique which we have used in this study.

The purpose of this study was to assess the analgesic efficacy of an US-guided TAP block. We hypothesized that a US-guided TAP block performed after Caesarean delivery would reduce patient-controlled analgesia (PCA) Tramadol consumption in the first 24 h after operation as part of a multimodal analgesic regimen.

Materials and Methods

This prospective double blinded study was conducted, after getting clearance and approval of the study protocol from our institutional ethical committee. Informed written consent was taken from all 60 adult parturient patients belonging to American Society of Anesthesiologists (ASA) Grade I and II, undergoing elective or nonurgent cesarean section(where no fetal or maternal compromise existed).

Exclusion Criteria

Patients who were unable to give informed consent. Patients having allergy to the Ropivacaine. Patients having skin infections at the needle site, morbidly obese (BMI > 40), patients having psychiatric disorders, patients in whom partial spinal effect was achieved and hence converted to general anesthesia and who were unable to understand visual analogue scale or use patient-controlled analgesia (PCA).

Randomisation

The study patients were randomly allocated among two groups, on the basis of computer-generated random number table, blinding was done and group name was concealed in an envelope, which was opened just before cesarean section. Opening of envelope and drug delivery was done by some other anesthesiologist, who was not involved in the study to make it double blinded.

Methodology

Each patient received in operation theatre was attached with multipara moniters, good intravenous line secured with 20 gauze cannula, preloading done with around 500 ml ringer lactate. In sitting position ,under all aseptic precautions, spinal anesthesia with 2–2.2 ml of 0.5 % heavy bupivacaine at L3–5 level was given. Intra-operative antiemetics were not used routinely, but if needed, 4 mg of ondansetron IV was used. All the patients received TAP block post cesarean section ,with either 20 ml 0.5 % ropivacaine ,each side(group A-study group) or normal saline 20 ml on each side (group B-control group).

Taking all aseptic precautions, TAP block was performed bilaterally using ultrasound. The linear array (13–6 MHz probe) was positioned in the mid-axillary line in the axial plane half-way between the iliac crest and the costal margin. Various structures were visualized like subcutaneous fat, external oblique muscle, in-

ternal oblique muscle, transversus abdominis muscle, peritoneum, and intraperitoneum (Fig. 1). A 150 mm long, 20 G short-bevel needle was introduced anteriorly and inserted in plane under real-time US guidance to lie between the internal oblique and the transversus abdominis muscles with the tip in the mid-axillary line. A total of 20 ml of study solution were injected on each side after aspiration to avoid intravascular placement. Successful injection produced an echolucent lens-shaped space between the two muscles.

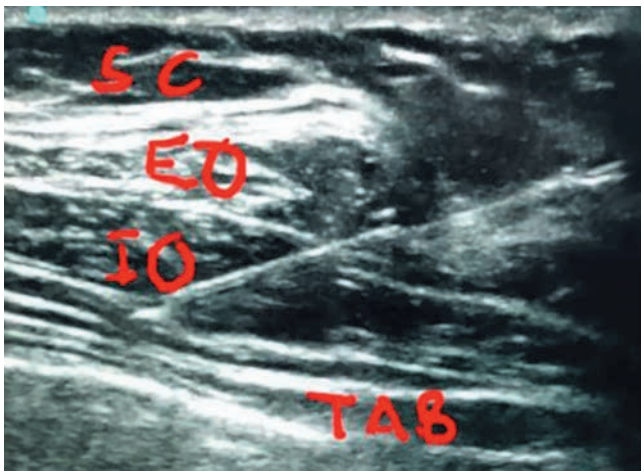

Figure 1. Shows the Needle placement in the plane between IO (Internal Oblique Muscle) and TAB (Transverses Abdominis Muscle). EO refers to External Oblique Muscle ,SC refers to Subcutaneous Fat

After receiving TAP block, all the patients were shifted to postanesthetic care unit. The patients received standard analgesia according to obstetric department protocol consisting IV diclofenac 75 mg 8 hourly, first dose was given at the end of surgery. In addition, they also received IV tramadol through PCA (4 mg/ml) with 20 mg dose, 10 min lockout interval and 1 h limit of 50 mg for the first 24 hours.

The Variables in the study to measure the outcome included the time for the first PCA Tramadol requirement, the total dosage of PCA Tramadol required in the first 24 hours, Intensity of pain at 6, 12 and 24 hours after surgery using the Visual Analogue Scale, presence of nausea, vomiting, pruritis etc which were assessed for the first 24 hours. The average pain they experienced over the 24 h postoperative period was rated on a 100 mm visual analogue scale (VAS) between 'no pain' (0) and 'very severe pain' (100 mm). All observations were noted by an independent observer who was unaware of group allocation. Secondary Variables included the days of Hospital stay after the Surgery.

Observations and Results

A total of 60 patients who underwent Emergency Cesarean Sections were included in the study. All received bilateral US-guided TAP blocks with either ropivacaine 0.5 % 20 ml on each side i. e. 40 ml total or saline, 30 patients in each group were included.

Both the groups were comparable in terms of age, height, weight, previous cesareans. The Table is annexed as Table 1.

The Time to first PCA Tramadol requirement was higher in the TAP Block with Ropivacaine as compared to the Control Group. The Median time for first PCA Tramadol usage was 12 h (inter-quartile range [IQR]: 8–17) in the study group as compared to 6h (inter-quartile range [IQR]: 2–8) in the control group The Table is annexed as Annexure 2. The p value was < 0.0001 making it statistically significant.

Patients who received TAP block with Ropivacaine (Study group) had significantly less mean total pain scores when compared to the control group (in the first 24 hours, with a P value of 0.0001 Unpaired t test). The Table is annexed as Table 2.

The cumulative tramadol usage during first 24 h after surgery was significantly reduced in study group in comparison to control group (85 ± 42 vs. 184± 55 mg respectively, P < 0.0001 Unpaired t test). The Table is annexed as Annexure 3. We have only included first 24 hours cumulative dosage as the patients were shifted out of Post operative room after 24 hours as per Hospital protocol / practice.

The Incidence of Post operative nausea and vomiting was not statistically significant on comparison in both

Table 1. Showing the Demographic data which was comparable in both the study as well as control group

Demographic Data	Study Group	Control Group
Age (years)	25.2 ± 3.4	26 ± 2.8
Weight (kg)	67.4 ± 5.3	67.8 ± 5.6
Height (cm)	154.3 ± 10.4	153.8 ± 14.3
Previous Sections		
Nil	8	6
1	20	21
2	2	3

Table 2. Showing comparison of the Time to first PCA Tramadol usage and pain scores at different time intervals between the two groups in the study

Observation	Study Group	Control Group	P value
Time to first PCA Tramadol (Mean and Inter quartile range)	12 hours (8–17)	6 hours (2–8)	0.0001
Total pain scores			
6 hours post section	15.2 ± 7.2 mm	34 ± 12.6 mm	< 0.05
12 hours post section	18.2 ± 5.4 mm	36.4 ± 7.4 mm	< 0.05
24 hours post section	21.7 ± 6.4 mm	29 ± 6.8 mm	< 0.05

the groups and no patient had itch / pruritis after TAP Block. The Duration of Hospital stay was equivocal in both the groups. The results are tabulated in Table 3.

Discussion

Management of post operative pain for Cesarean section patients is challenging as any post operative analgesic regimen deployed should be effective as well as have low side effects to the lactating mother as well as newborn.

Inadequate pain control can lead to increased morbidity, prolonged hospital stays, delayed recovery, and a higher risk of complications.

Table 3.

Observation	Study Group	Control Group	P value
Cumulative PCA Tramadol Usage 24 Hours post Operative period	85 ± 42 mg	184± 55 mg	< 0.0001
Post Operative Nausea and Vomiting	6	5	0.68
Pruritis (Itch)	0	0	
Duration of Hospital Stay	5 ± 1 days	4.5 ± 1 days	0.71

Traditional postoperative pain management strategies often rely on systemic opioids, which are associated with adverse effects such as respiratory depression, nausea, vomiting, and ileus. These effects can be particularly detrimental in the context of cesarean section patients where early mobilization and recovery are crucial.

In recent years, regional anesthesia techniques have gained prominence in the management of postoperative pain. The transverse abdominis plane (TAP) block, introduced by Rafi in 2001[8], has garnered attention due to its potential to provide targeted analgesia to the anterior abdominal wall. The TAP block involves injecting local anesthetic between the internal oblique and transverse abdominis muscles, thereby blocking the sensory nerves supplying the anterior abdominal wall.

Ultrasound guidance has revolutionized the field of regional anesthesia, enhancing accuracy and safety by enabling real-time visualization of needle placement and local anesthetic spread. Ultrasound-guided TAP block has demonstrated superior outcomes compared to blind techniques in terms of efficacy, success rates, and reduction in opioid consumption in various surgical settings[6].

Ultrasound guided TAP block is a relatively new abdominal nerve block with excellent efficacy after a variety of abdominal surgeries including cesarean section[1–5].

Similar to earlier studies, our study also demonstrates the lower requirement of supplemental analgesia, delayed time to first PCA Tramadol usage, better pain management in patients with TAP block as compared to the control group[9–11]. No adverse effects were reported due to the TAP Block but there was no statistically significant difference in the post operative nausea and vomiting between the 2 groups. Various studies using USG guided TAP Block have shown lower post operative nausea and vomiting in the TAP block group attributed to lower Tramadol consumption[9–11] but our study did not show any such association.

Also our study did not demonstrate any significant lower duration of hospital stay in TAP block group probably because of less established hospital protocols for discharge which depends on various other parameters beyond the scope of this study.

Conclusion

To conclude, this study observed analgesic benefit of TAP block when employed with standard postoperative analgesia after cesarean section done under spinal anesthesia. It is a safe and effective technique for providing

postoperative analgesia; which allows accurate needle placement, reduces the risk of complications, and improves the success rate of the block. TAP block can reduce opioid consumption, improve pain control, facilitate early mobilization; hence can be a promising tool in multimodal analgesia. Furthermore, TAP block can be performed safely in hemodynamically unstable patients, making it a useful analgesic technique in critically ill patients.

Limitations of the current study include the small sample size which limits the generalizability of the findings. There is also a need for standardized protocols for TAP block, including the optimal technique, dose, and timing of administration. Further research is needed to determine the long-term outcomes of TAP block, including its impact on recovery, quality of life, and healthcare costs.

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Використання площинної блокади поперечного м'яза живота для післяопераційного знеболення пацієнток з екстреним кесарським розтином: проспективне дослідження

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Анотація. Вступ. *Післяопераційне знеболення є важливим аспектом періопераційної допомоги для пацієнток з екстреним кесарським розтином. Ефективний контроль болю підвищує комфорт пацієнток, сприяє ранній мобілізації, знижує ризик ускладнень і скорочує тривалість перебування в лікарні. Площинна блокада поперечного м'яза живота (TAP-block) є добре відомою технікою забезпечення знеболення передньої черевної стінки, що значно зменшує післяопераційний біль. В останні роки УЗ контроль усе частіше використовується для підвищення точності та безпеки TAP-блокади. У статті розглядається використання TAP-блокади під УЗ контролем для післяопераційного знеболення пацієнток з екстреним кесарським розтином.*

Методи: *У дослідженні взяло участь 60 пацієнток, які перенесли екстрений кесарський розтин. Усім виконали двосторонню TAP-блокаду під УЗ контролем з використанням 0,5 % ропівакаїну (20 мл з кожного боку, загалом 40 мл) або фізіологічного розчину. Усі учасниці отримали спинномозкову анестезію з бупівакаїном, після операції – ацетамінофен, НПЗП та трамадол внутрішньовенно під контролем пацієнтки (PCA). Через 24 години після пологів кожній пацієнтці проводили оцінку за такими показниками: застосування PCA трамадолу, інтенсивність болю за шкалою, нудота, блювання, свербіж та тривалість перебування в лікарні.*

Результати та висновки: *З 60 пацієнток 30 були у дослідній групі, а 30 — у плацебо-групі. Загальнее використання PCA трамадолу через 24 години було знижено у дослідній групі порівняно з плацебо-групою (P < 0,05). Дослідна група повідомляла про підвищення задоволеності від знеболювання відповідно до оцінки за візуально-аналоговою шкалою (VAS), порівняно з плацебо-групою (P = 0,008). Місцевих ускладнень, пов'язаних з TAP-блокадою, не спостерігалося.*

Площинна блокада поперечного м'яза живота виявилася ефективною для забезпечення знеболення зі значним зменшенням використання трамадолу протягом 24 годин після кесарського розтину як додатковий метод до стандартного знеболення.

Ключові слова: *TAP-блокада, кесарський розтин, площинна блокада поперечного м'яза живота, ропівакаїн*