



Original Research Article

The postoperative analgesic efficacy of Transversus abdominis plane block after caesarean section: A randomized trial

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ABSTRACT

Background: The present study was conducted to evaluate the postoperative analgesic efficacy of Transversus abdominis plane block after caesarean section and to compare it with patients who were managed conventionally without the TAP Block.

Materials and Methods: The present study was conducted as a comparative study at Department of Anaesthesiology, Hamidia Hospital for a period of 1 year among 100 females undergoing caesarean section. All the selected women were randomly divided into two groups of 50 patients each. Hemodynamic parameters, pain and postoperative analgesic requirement was observed and compared between two groups.

Results: Pain at various interval of time was significantly lower in TAP block group as compared to control group ($p < 0.01$). Mean time to rescue analgesia was 356.44 ± 91.63 min and 95.12 ± 24.14 min in groups TAP and control groups respectively and the observed difference was statistically highly significant ($p < 0.001$).

Conclusion: TAP block is effective in providing postoperative analgesia among women undergoing LSCS. It is one of the excellent multimodal analgesia technique and significantly reduces the opioid requirements during postoperative period. TAP block was easy to perform, and provided reliable and effective analgesia in this study, and no complications due to the TAP block were detected.

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1. Introduction

Postoperative pain management is an essential and one of the most important components of any surgical procedure.¹ The pathophysiology of pain in surgical procedure is attributed to various metabolic and inflammatory responses. Ineffective pain control during post-operative period have been associated with hypercoagulable state and thus with increased risk of deep vein thrombosis, pulmonary embolism, pneumonia, poor wound healing, coronary ischemia, and myocardial infarction. Presence of pain is also a contributory factor for increased morbidity of patients, extended lengths of stay and patient dissatisfaction.^{2–5}

Pain in postoperative period is usually controlled with the aid of systemic or epidural opioids. Though such technique is effective in producing analgesia but they are associated with side effects such as nausea, pruritis, vomiting, etc.^{6,7} Various techniques such as abdominal field blocks, ilioinguinal, and hypogastric nerve blocks that causes direct neuraxial blockade are effective in providing significant postoperative analgesia among patients undergoing caesarean section.⁸ But such blockade is difficult as anatomical landmarks guiding the block are not clearly defined.

To overcome such problems, a modified technique for abdominal field block was demonstrated by Rafi AN et al in 2001. This block was called Transversus abdominis plane block (TAP) which was administered via

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triangle of Petit (lumbar region).⁹ Triangle of Petit is anatomical space which is bounded external oblique muscle (anteriorly), latissimus dorsi muscle (posteriorly) and iliac crest (inferiorly).⁹ Local anaesthesia, when injected via petit triangle, provide significant analgesia by blocking the lower intercostal nerves (T7 - T12), ilio-hypogastric nerve and ilio-inguinal nerve as they traverse in the neuro-vascular plane of abdominal musculature.¹⁰

Literature suggest that TAP Block as a part of multimodal analgesic regimen would result in decreased opioid consumption and improved analgesia.^{9,11}

Thus the present study was conducted to evaluate the postoperative analgesic efficacy of Transversus abdominis plane block after caesarean section and to compare it with patients who were managed conventionally without the TAP Block.

2. Materials and Methods

The present study was conducted as a comparative study at Department of Anaesthesiology, Gandhi Medical college and associated Hamidia Hospital Bhopal for a period of 1 year i.e. from 1st April 2018 to 30th March 2019. This study was approved by Institute's ethical committee. A total of 100 females undergoing caesarean section with ASA grade I and II; belonging to age group of 18 to 40 years were included. Patients with ASA III or higher, not giving consent for the procedure, with history of drug allergy, infection at the site of injection, with coagulopathy, and chronic pain syndrome were excluded from the study. Written consent was obtained from all the study participants fulfilling the inclusion criteria. Detailed sociodemographic data was obtained from all the patients and physical examination was done. Baselines data like pulse rate, blood pressure, respiratory rate, and basic investigations were collected. Patients were explained about the procedures and postoperative follow up pattern. The VAS was explained as 0-10 cm scale reading and patient was asked to tell the number. All the selected women were randomly divided into two groups of 50 patients each using random number table.

Group A- received 20 ml of 0.375% ropivacaine via TAP block.

Group B- received 20 ml of 0.375% ropivacaine via spinal anesthesia.

The group B acted as control and was given spinal anesthesia (SA) with 20 ml of 0.375% ropivacaine in L3-L4 subarachnoid space with spinal needle in lateral position. They were immediately turned in supine position. Patients in TAP group received the same anaesthesia, but after completion of surgery and were also given TAP block with 0.375% ropivacaine 20 ml along in each side before applying dressing on the wound.

2.1. TAP Block

The area was prepared with chlorhexidine and TAP blocks were performed bilaterally using a blunt regional anesthesia needle. A 'double-pop' landmark technique (mid-point of the iliac crest and the costal margin in the midaxillary line) was used to locate the site of block. All the blocks were performed by single anaesthesiologist. After observing closely for signs of toxicity patients were shifted to post operative ward.

Standard postoperative analgesic regimen: Inj. Diclofenac sodium 75mg i.m. was given to all patients after shifting to the ward and repeat dose was given after 12 hours. Inj. Tramadol 100 mg intramuscularly was used as first rescue analgesia when the VAS score was ≥ 3 or when demanded by the patient. Repeat dose was given if needed after 3-6 hours.

The presence and severity of pain was assessed using visual analogue scale (VAS 0 =no pain and 10 =worst pain imaginable) at 1, 2, 3, 4, 6, 8, 12, 18, and 24 hours by an investigator. Vitals (HR, SBP, DBP) were also recorded upto 6 hours in the immediate post operative period after TAP block, and time for first demand of tramadol, and total dose of tramadol as rescue analgesia given to the patient was documented. Any local complications of the TAP block were also recorded.

2.2. Statistical analysis

The data was analyzed using IBM SPSS software version 20. Data were expressed as mean \pm SD. Statistical significance of the difference of mean values between two groups was calculated using independent t test whereas statistical significance of the difference in proportions was calculated using Chi-square test. A P value of <0.05 was considered statistically significant.

3. Observation and Result

A total of 100 women undergoing caesarean section were included in present study and were randomly allocated into two groups- Group A i.e. TAP block and group B i.e. control group.

The two groups were comparable in terms of demographic and baseline variables such as age, ASA status, and duration of surgery ($p>0.05$) (Table 1).

Characteristics of blocks such as sensory and motor block onset as well as regression time were similar in both the groups. Also hemodynamic variables were stable and comparable in both the groups throughout the observation period ($p>0.05$).

Above table reveal comparison of VAS score between two groups. It was observed that pain at various interval of time was significantly lower in TAP block group as compared to control group ($p<0.01$).

Mean time to rescue analgesia was 356.44 ± 91.63 min and 95.12 ± 24.14 min in groups TAP and control groups respectively and the observed difference was statistically highly significant ($p < 0.001$) (Figure 1)

Tramadol required was significantly low in TAP group compared to Control group, 58.7 mg versus 136.78 mg and the difference was statistically highly significant ($p < 0.01$).

Table 1: Distribution according to Demographic variables

| Demographic variable | Group A (n=50) | Group B (n=50) | P value |
|------------------------|----------------|----------------|---------|
| Age (Mean±SD) | 28.12±3.17 | 28.54±2.99 | 0.49 |
| ASA I/II | 18/32 | 21/29 | 0.54 |
| Duration surgery (min) | 35.24±10.56 | 36.77±9.41 | 0.45 |

Table 2: Distribution according to VAS score

| Vas Score (Hours) | Group A | Group B | P value |
|-------------------|----------|----------|---------|
| 1 hour | 0 | 0 | NA |
| 2 hours | 0 | 1.14±0.3 | 0.013 |
| 3 hours | 0.5±0.1 | 2.2±1.2 | 0.001 |
| 4 hours | 1.2±0.7 | 4.04±1.4 | 0.001 |
| 6 hours | 2.6±1.13 | 4.9±2.1 | 0.001 |
| 8 hours | 2.2±0.7 | 4.7±0.7 | 0.001 |
| 12 hours | 2.0±0.72 | 3.3±1.1 | 0.001 |
| 18 hours | 2.0±0.54 | 2.8±0.74 | 0.001 |
| 24 hours | 1.9±0.36 | 2.5±0.5 | 0.001 |

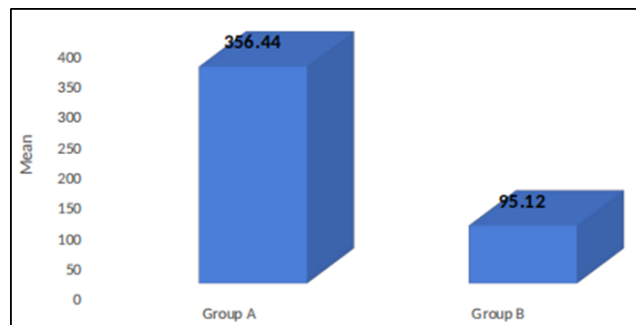


Fig. 1: Comparison of mean time to rescue analgesia.

4. Discussions

Pain after abdominal surgeries is often severe and caesarean section is no exception. Effective postoperative analgesia has shown to accelerate recovery, early ambulation, promote infant care (including breast feeding, maternal-infant bonding) and prevention of postoperative morbidity from caesarean section.

Thus, effective pain management can improve the quality of postoperative recovery by reducing pain and analgesic requirements. Various modes of analgesia such as systemic or neuraxial opioids, NSAIDs, and epidural analgesia have

been used for managing pain during the postoperative period.

However, these methods have their own advantages and disadvantages such as MeanNSAIDs does not provide adequate pain relief, systemic opioids cause respiratory depression and sedation; neuraxial opioids are associated with pruritis and urinary retention. Thus, efforts are being directed to identify methods to reduce the use of opioids. TAP block is one such method which was used to reduce the need of opioid while improving the level of analgesia.¹²

Pain was assessed using VAS score in present study and it was observed that VAS score was significantly lower in TAP block group as compared to control group during all the intervals of time. Interestingly the VAS score was zero in study group for the first 2-3 hours which itself explains the effectiveness of TAP block. VAS score even at 24 hours was significantly lower in TAP block group as compared to the control group. The findings of present study were correlated with the finding of Naveen et al in which VAS score was significantly lower in TAP block group as compared to control group ($p < 0.01$).¹² The reason for prolonged duration of analgesic effect after TAP blockade may be due to the relatively poor vascularisation and slowed drug clearance from Transversus abdominis plane, and may be due to avoidance of central sensitization by giving TAP block end operatively.¹¹

In our study, we found that time to rescue analgesia was significantly prolonged, and the tramadol consumption was significantly reduced in TAP block group when compared to control group ($p < 0.05$). These findings were similar to study by Naveen et al¹² and Chansoria et al¹³ in which the authors observed significantly reduced pain scores and postoperative analgesic requirement in TAP block group. In contrast to present study, Kadam et al. compared TAP block for postoperative pain relief after laparoscopic cholecystectomy, and found no significant difference in pain score and analgesic requirements between two groups.¹⁴ The observed difference could be due to difference in surgical procedures i.e. they were dealing with was an upper abdominal surgery. As in laparoscopic cholecystectomy, the main site for port insertion is epigastrium and usually this site is not effectively blocked by TAP block. The nerve supplying the epigastric area (T6) generally comes directly from the intercostal space to epigastrium rather than going to the TAP plane in the flank.¹²

5. Conclusion

Based on the findings of present study, it was concluded that TAP block is effective in providing postoperative analgesia among women undergoing LSCS.

It is one of the excellent multi modal analgesia technique and significantly reduces the opioid requirements during postoperative period. TAP block was easy to perform, and provided reliable and effective analgesia in this study, and

no complications due to the TAP block were detected.

6. Conflict of Interest

None.

7. Source of Funding

None.

References

- Carvalho B, Cohen SE, Lipman SS, Fuller A, Mathusamy AD, Macario A, et al. Patient preferences for anesthesia outcomes associated with cesarean delivery. *Anesth Analg*. 2005;101(4):1182–7. doi:10.1213/01.ane.0000167774.36833.99.
- Carr DB, Goudas LC. Acute pain. *Lancet*. 1999;353(9169):2051–8. doi:10.1016/S0140-6736(99)03313-9.
- Breivik H. Postoperative pain management: why is it difficult to show that it improves outcome? *Eur J Anaesthesiol*. 1998;15(6):748–51. doi:10.1097/00003643-199811000-00022.
- Practice Guidelines for Acute Pain Management in the Perioperative Setting: An Updated Report by the American Society of Anesthesiologists Task Force on Acute Pain Management. *Anesthesiology*. 1995;82:1071–81. doi:10.1097/ALN.0b013e31823c1030.
- Twersky R, Fishman D, Homel P. What happens after discharge? Return hospital visits after ambulatory surgery. *Anesth Analg*. 1997;84(2):319–24. doi:10.1097/00000539-199702000-00014.
- Farragher RA, Laffey JG. Postoperative pain management following cesarean section. In: Shorten G, Carr D, Harmon D, editors. *Postoperative pain management: an evidence-based guide to practice*. Philadelphia, PA: Saunders Elsevier; 2006. p. 225–38.
- Overdyk FJ, Carter R, Maddox RR, Calura J, Herrin AE, Henriquez C, et al. Continuous Oximetry/Capnometry monitoring reveals frequent desaturation and bradypnoea during patient controlled analgesia. *Anesth Analg*. 2007;105(2):412–8.
- Aveline C, Hetet HL, Roux AL, Vautier P, Cognet F, Vinet E, et al. Comparison between ultrasound-guided transversus abdominis plane and conventional ilioinguinal/iliohypogastric nerve blocks for day-case open inguinal hernia repair. *Br J Anaesth*. 2011;106(3):380–6. doi:10.1093/bja/aeq363.
- Rafi AN. Abdominal field block: A new approach via the lumbar triangle. *Anaesthesia*. 2001;56(10):1024–6. doi:10.1046/j.1365-2044.2001.02279-40.x.
- Netter FH. Abdomen posterolateral abdominal wall. In: *Atlas of human anatomy summit*. New Jersey, USA: The Ciba-Geigy Corporation; 1989. p. 230–40.
- Mcdonnell JG, Donnell B, Curley G, Heffernan A, Power C, Laffey JG, et al. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial. *Anesth Analg*. 2007;104(1):193–7. doi:10.1213/01.ane.0000250223.49963.0f.
- Naveen S, Singh RK, Sharma PB, Anne S. Evaluation of transversus abdominis plane block for postoperative analgesia after lower segment cesarean section. *Karnataka Anaesth J*. 2017;3:41–4. doi:10.4103/kaj.kaj_7_18.
- Chansoria M, Hingwe S, Sethi A, Singh R. Evaluation of transversus abdominis plane block for analgesia after cesarean section. *J Recent Adv Pain*. 2015;1(1):13–7. doi:10.5005/jp-journals-10046-0005.
- Kadam VR, Howell S, Kadam V. Evaluation of postoperative pain scores following ultrasound guided transversus abdominis plane block versus local infiltration following day surgery laparoscopic cholecystectomy-retrospective study. *J Anaesthesiol Clin Pharmacol*. 2016;32(1):80–3. doi:10.4103/0970-9185.168195.

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