



THE EFFICACY OF ULTRASOUND GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK WITH BUPIVACAINE FOR POSTOPERATIVE ANALGESIA IN INFRAUMBILICAL SURGERY: A CASE SERIES

Anaesthesiology

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ABSTRACT

Introduction : In recent years, there has been a growing trend towards favoring peripheral nerve blocks over neuraxial techniques, largely due to their superior safety profile, particularly in abdominal surgeries. Among these, the transversus abdominis plane (TAP) block is notable for providing effective analgesia. **Aim:** To evaluate the efficacy of ultrasound guided TAP block using 0.25% Bupivacaine. **Methods:** The study included 60 patients which were analyzed for postoperative pain using a Visual Analog Scale (VAS) at rest, during movement, and on coughing. Pain scores were recorded at 0, 2, 4, 6, 8, 10, 12, and 24 hours postoperatively. **Results:** In the present study, during the first 6 hours, no patient required an analgesic dose, resulting in a VAS score of zero. Up to 14 hours, there was a decrease in VAS scores due to the effectiveness of the USG-guided TAP block. The overall average pain score over the 24-hour period was found to be 3. **Conclusion:** The Ultrasound-Guided Transversus Abdominis Plane (USG TAP) block with 0.25% Bupivacaine proved to be an effective choice for postoperative pain management in infraumbilical surgeries.

KEYWORDS

Transversus Abdominis Plane Block, Postoperative Analgesia, Bupivacaine, Infraumbilical Surgeries

INTRODUCTION

In recent years, there has been a growing trend towards favoring peripheral nerve blocks over neuraxial techniques, largely due to their superior safety profile, particularly in abdominal surgeries. Among these, the transversus abdominis plane (TAP) block is notable for providing effective analgesia to the parietal peritoneum, skin, and muscles of the anterior abdominal wall, making it an excellent choice when postoperative pain is predominantly somatic. The introduction of ultrasound (USG)-guided methods has further boosted the popularity of the TAP block by enhancing its success rate, as it allows for direct visualization during drug administration.⁽¹⁻³⁾

The transversus abdominis plane is the fascial plane between the internal oblique and transversus abdominis muscle containing the thoracolumbar nerves T10 to L1. The introduction of local anaesthetic in this plane blocks nerves from T10 to L1. Ultrasonography (USG)-guided TAP block reduces requirement of opioids and provides effective and adequate analgesia.⁽⁴⁾

Effective postoperative pain control is crucial for ensuring patient comfort, promoting early mobilization, and facilitating faster recovery. Proper management of postoperative pain has also been shown to significantly reduce perioperative morbidity, particularly in high-risk patients prone to acute coronary and thrombotic events. While opioids are commonly used for pain relief during the perioperative period, they come with a range of side effects. Consequently, adopting a multimodal analgesic approach is essential. Regional anesthesia and analgesia have proven to deliver excellent pain relief and offer benefits that extend beyond the immediate perioperative period.⁽⁵⁻⁷⁾

The objective of this study is to assess the effectiveness of ultrasound-guided TAP block using 0.25% Bupivacaine in patients undergoing infraumbilical surgeries, with a specific focus on postoperative pain management. The study aims to evaluate the efficacy of the TAP block by measuring the Visual Analogue Score (VAS) over a 24-hour period, determining the number of rescue analgesic doses required within the first 24 hours postoperatively, and analyzing the duration of postoperative analgesia.

METHODS

This prospective study was initiated after obtaining approval from the ethical and scientific committee. Enrollment included patients scheduled for infraumbilical surgeries under spinal anesthesia, who provided informed consent.

Sample Size: The study included 60 patients.

Inclusion Criteria:

- Patients scheduled for infraumbilical surgeries.
- ASA physical status I and II.
- Age group of 18 years and above.

Exclusion Criteria:

- Patients with ASA physical status III and IV.
- History of relevant drug allergy.
- Coagulopathy or anti-coagulation treatment (INR > 1.5).
- Preoperative chronic opioid dependence.
- Infection at the site of injection.
- Patients with chronic pain syndrome.
- Body mass index (BMI) ≥ 35 kg/m².
- History of substance abuse.

Procedure: After the completion of the surgical procedure, under all aseptic precautions, the identification of the Petit triangle was performed. A linear ultrasound probe (5-12 MHz) was placed in the axial plane across the mid-axillary line, midway between the costal margin and the iliac crest. Three layers of the abdominal wall were identified. A 23G blunt-tipped short bevel sonoplex needle was inserted in-plane until its tip was located between the internal oblique and transversus abdominis muscles. The patients received a Bilateral TAP block with 15 ml of 0.25% Bupivacaine on each side (total = 30 ml). The block targeted the lower intercostal nerves (T7 - T12), iliohypogastric nerve, and ilio-inguinal nerve.

Postoperative Assessment: Patients were analyzed for postoperative pain using a Visual Analog Scale (VAS) at rest, during movement, and on coughing. Pain scores were recorded at 0, 2, 4, 6, 8, 10, 12, and 24 hours postoperatively. The need for rescue analgesia was assessed by the time to the first dose of Tramadol requirement and the total dose of Tramadol over the 24-hour postoperative period. All patients received injection Tramadol 100 mg IV as rescue analgesia whenever pain scores were recorded above 3.

Transversus abdominis plane block (TAP) technique

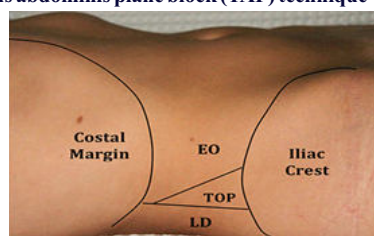


Figure 1: Landmarks outlining the Triangle of Petit (EO, external oblique muscle; TOP, triangle of petit; LD, latissimus dorsi muscle)

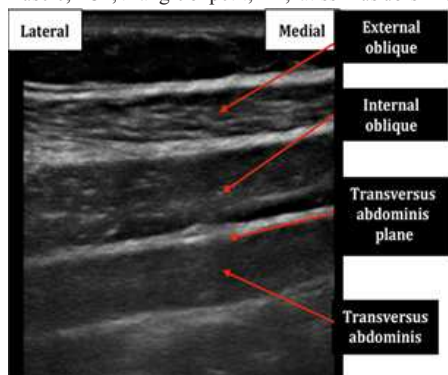


Figure 2: Transversus Abdominis Plane Block

RESULTS

In the present study, during the first 6 hours, no patient required an analgesic dose, resulting in a VAS score of zero. Up to 14 hours, there was a decrease in VAS scores due to the effectiveness of the USG-guided TAP block. However, after this period, VAS scores began to increase, leading to a higher demand for analgesics. VAS scores decreased again within 12-14 hours as rescue analgesics were administered to most patients during the 6-12 hour window. The overall average pain score over the 24-hour period was found to be 3.(Fig 3)

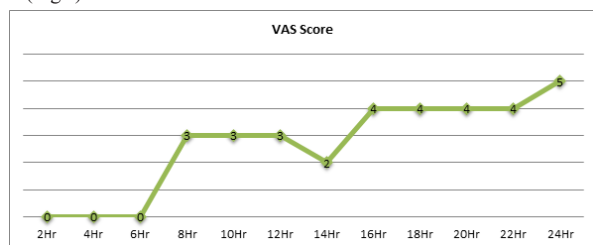


Fig 3: VAS score

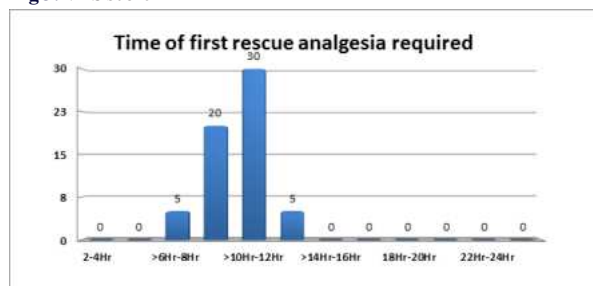


Fig 4: Distribution of study subjects according to first rescue analgesia required.

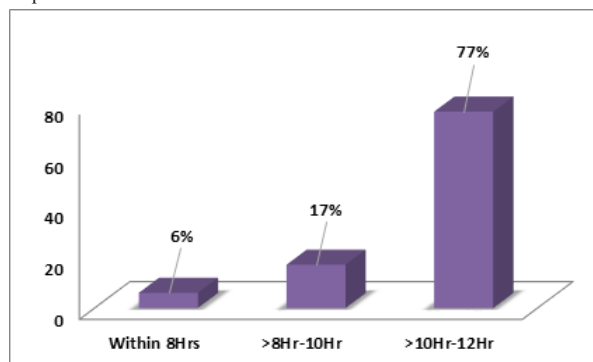


Fig 5: Distribution of study subjects according to Duration of Analgesia

Out of the 60 patients, 50% (30 patients) required their first dose of rescue analgesia within 10-12 hours. A total of 33.3% (20 patients) needed it within 8-10 hours, while 8.5% (5 patients) required it

between 6-8 hours, and another 8.5% (5 patients) within 12-14 hours. Approximately 84% (50 patients) required their first rescue analgesia dose within the 8-12 hour window. The average dose of Tramadol administered over the 24-hour period ranged from 50 to 100 mg.(Fig.4)

In present study average duration of analgesia with USG TAP Block is 08-12 hours. 77% patients had duration of analgesia 10-12 hours. 17% patients had duration of analgesia 8-10 hours. Remaining 6% patients had duration of analgesia < 8 hours. It does not vary with age, sex & type of surgery.

DISCUSSION

The results of our study showed that during the first 6 hours, no patient required an analgesic dose, resulting in a VAS score of zero. Up to 14 hours, there was a decrease in VAS scores due to the effectiveness of the USG-guided TAP block. However, after this period, VAS scores began to increase, leading to a higher demand for analgesics. VAS scores decreased again within 12-14 hours as rescue analgesics were administered to most patients during the 6-12 hour window. Similar findings were showed by study done by **McDonnell JG et al⁽⁶⁾** and **Mankikar MG et al⁽⁹⁾** where study confirmed the usefulness of TAP block as seen by the reduced the VAS and requirement for morphine. Also study done by **Rautela MS et al⁽¹⁾** found that USG-guided TAP block is a good alternative, with longer and effective postoperative analgesia.

CONCLUSIONS

The Ultrasound-Guided Transversus Abdominis Plane (USG TAP) block with 0.25% Bupivacaine proved to be an effective choice for postoperative pain management in infra-umbilical surgeries. It significantly reduced the VAS scores, resulting in a decreased need for rescue analgesics. The majority of patients experienced pain relief for approximately 8-12 hours without any complications. Additionally, the TAP block with 0.25% Bupivacaine notably extended the time before the first dose of rescue Tramadol was required.

Limitation

The relatively small sample size of 60 patients may limit the generalizability of the findings to a broader population. Without a control group or comparison with other analgesic techniques, it is difficult to assess the relative efficacy of the TAP block with 0.25% Bupivacaine. Pain scores are subjective and can vary based on individual patient perceptions and tolerances, potentially introducing variability in the results. The study focuses on pain relief and analgesic requirements within the first 24 hours postoperatively, which may not capture long-term outcomes or complications.

Recommendation

Incorporating a control group or comparing the TAP block with 0.25% Bupivacaine to other postoperative analgesic techniques would provide a more comprehensive understanding of its relative efficacy. Extending the follow-up period beyond 24 hours to assess the long-term effects of the TAP block, including its impact on chronic pain and recovery, would provide valuable insights. Future studies should include a larger, more diverse patient population across multiple centers to enhance the generalizability of the results and reduce the potential for institutional bias.

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Conflicts of interest: There are no conflicts of interest.

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