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COMPARATIVE EVALUATION OF TAP AND LOCAL INFILTRATION OF 20 ML OF BUPIVACAINE 0.25% FOR POSTOPERATIVE ANALGESIA IN OPEN INGUINAL HERNIA REPAIR

Anaesthesiology

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ABSTRACT

Background and aim: Transversus abdominis plane block (TAP block) is a novel procedure to provide postoperative analgesia following inguinal hernia surgery. The utilization of ultrasound has greatly augmented the success rate of this block and additionally avoiding complications. The aim of our study was to gauge the analgesic efficacy of ultrasound-guided TAP block in patients undergoing unilateral open inguinal hernia repair. **Materials and methods:** 60 male patients scheduled for elective inguinal hernia repair were selected for the study. At the end of the surgical procedure, they were randomly divided into two groups. Ultrasound-guided TAP block was performed with 20 mL of 0.25% bupivacaine or local infiltration with 10 mL of 0.25% bupivacaine . Visual analog scale (VAS) scores were used to assess pain. Paracetamol was given if VAS > 3 and tramadol was used when VAS > 6. Patients were monitored for VAS scores and total analgesic consumption for the 24-hour period. **Results:** The TAP block with bupivacaine reduced VAS scores at 4, 6, and 12 hours. There was no distinction in VAS scores at 0, 2, and 24 hours between the two groups. The duration of analgesia for TAP block with bupivacaine lasted for 390 minutes. Total analgesics consumption was also significantly reduced in TAP with bupivacaine than the group with local infiltration. No complication was reported in both the groups. **Conclusion:** The ultrasound-guided TAP block provides good postoperative analgesia, reduces analgesic requirements, and provides good VAS scores with fewer complications following open inguinal hernia surgery.

KEYWORDS

TAP block, Bupivacaine, Post operative analgesia, Regional block

INTRODUCTION

Transversus abdominis plane (TAP) block is a novel procedure providing postoperative analgesia following inguinal hernia surgery. The utilization of ultrasound has significantly augmented the success rate of this block while avoiding complications. The aim of our study was to gauge the analgesic efficacy of ultrasound-guided TAP block in patients undergoing unilateral open inguinal hernia repair.

TAP Block (Transversus Abdominis Plane Block)

A TAP block is a type of regional anesthesia technique used for abdominal surgeries. The procedure involves injecting a local anesthetic, such as bupivacaine, into the transversus abdominis plane, located between the internal oblique and transversus abdominis muscles. The primary purpose of the TAP block is to provide pain relief for abdominal surgeries and it can be particularly effective for inguinal hernia repairs.

Local Infiltration with Bupivacaine

Local infiltration refers to the injection of a local anesthetic directly into the surgical site or the area surrounding a wound. In this method, bupivacaine is injected into the specific tissues where the surgery is taking place or where pain relief is needed. Local infiltration with bupivacaine is used to numb a specific area and reduce pain during and after minor surgical procedures. It is commonly employed in dermatological and soft tissue surgeries.

MATERIALS AND METHODS

This was a prospective, randomized, controlled study with two groups of 31 participants each. Group 1 received a TAP block, while Group 2 received local infiltration with bupivacaine. Randomization was achieved using the block randomization with sealed envelope technique.

Inclusion Criteria

Participants were included if they had an ASA physical status grade of I or II, were aged between 18 and 60 years, weighed between 50 and 80 kilograms, and had a height between 150 and 180 centimeters. They must have been scheduled for elective unilateral inguinal hernia surgeries under subarachnoid block.

Exclusion Criteria

Exclusion criteria included refusal to participate in the study, infections at the site of injection, coagulopathy, and a history of cardiac, respiratory, renal, or hepatic diseases. Patients allergic to the study medication or local anesthetics were also excluded.

Primary Outcomes

The primary outcomes measured were the onset of sensory block, defined as the time to loss of cold sensation, the effectiveness of the block assessed using the Visual Analog Scale (VAS), and the duration of postoperative analgesia, measured as the time to first rescue analgesic.

Secondary Outcomes

Secondary outcomes included the total consumption of analgesics in the first 24 hours postoperatively, the incidence of side effects, and any other observations noted during the study.

Methodology

A pre-anesthetic check-up was conducted, and the study procedure, including the VAS, was explained to participants. Informed written consent was obtained. Participants fasted for six hours and were pre-medicated with Tab. Alprazolam 0.25 mg and Tab. Pantoprazole 40 mg the night before surgery. Standard monitoring was applied, and a subarachnoid block was administered. Surgery commenced after the sensory level of the block reached T6. The study solution was prepared by an anesthesiologist not involved in the study.

After the completion of surgery, participants in Group 1 received a TAP block using a blunt regional anesthesia needle with ultrasound guidance to administer 10 ml of 0.25% bupivacaine when the spinal level receded to T10. Participants in Group 2 received local infiltration with bupivacaine; the anesthesiologist provided 10 ml of 0.25% bupivacaine through an aseptic method to the operating surgeon, who deposited 5 ml of bupivacaine above and 5 ml below the surgical incision site.

Statistical Analysis

Data was entered into an MS EXCEL spreadsheet and analyzed using the Statistical Package for Social Sciences (SPSS) version 21.0. Normality of data was tested using the Kolmogorov-Smirnov test. If normality was rejected, non-parametric tests were used. Statistical tests employed included the Independent T-test/Mann-Whitney Test for comparisons between the two groups, ANOVA/Kruskal-Wallis test for comparisons between three groups, and Paired T-test/Wilcoxon test for within-group comparisons. The Chi-Square test or Fisher exact test was used for categorical data.

OBSERVATIONS AND RESULTS

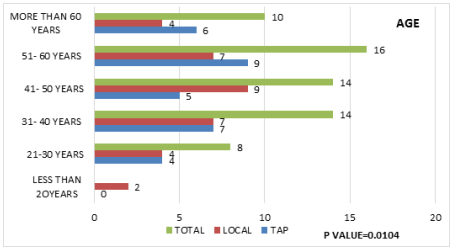

Figure 1: Age Distribution of Participants

This chart shows the age distribution of participants who received either TAP block or local infiltration for postoperative analgesia in inguinal hernia repair. The participants are grouped into six age categories: less than 20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, and more than 60 years. The total number of participants, those who received local infiltration (LOCAL), and those who received the TAP block (TAP) are represented. The p-value for the age distribution is 0.0104, indicating a statistically significant difference in the age distribution between the two groups.

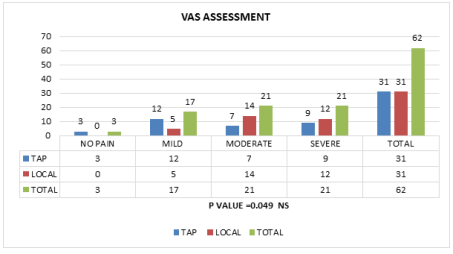

Figure 2: VAS Assessment

This chart displays the Visual Analog Scale (VAS) assessment of pain for participants in the TAP and local infiltration groups. The pain levels are categorized as no pain, mild, moderate, and severe. The total number of participants in each pain category is also shown. The p-value is 0.049, indicating a significant difference in pain levels between the two groups.

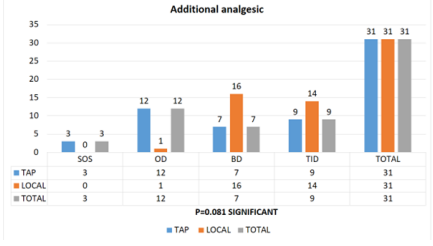

Figure 3: Additional Analgesic Requirement

This chart shows the additional analgesic requirements for participants in the TAP and local infiltration groups. Analgesic requirements are categorized as SOS (as needed), OD (once daily), BD (twice daily), and TID (three times daily). The total number of participants requiring additional analgesia in each category is presented. The p-value is 0.081, indicating a significant difference in additional analgesic requirements between the two groups.

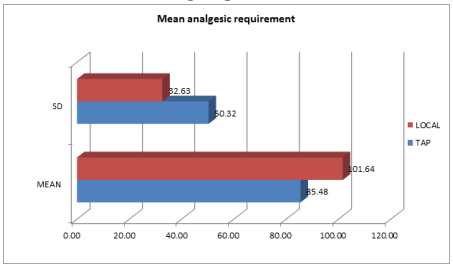

Figure 4: Mean Analgesic Requirement

This chart compares the mean and standard deviation (SD) of analgesic requirements for participants in the TAP and local infiltration groups. The mean analgesic requirement is lower in the TAP group (85.48) compared to the local infiltration group (101.64). The standard deviation is 50.32 for the TAP group and 32.63 for the local infiltration group, indicating variability in analgesic requirements within each group.

The TAP block with bupivacaine reduced VAS scores at 4, 6, and 12 hours postoperatively. There was no significant difference in VAS scores at 0, 2, and 24 hours between the two groups. The duration of analgesia for the TAP block with bupivacaine lasted for 390 minutes, and total analgesic consumption was significantly lower in the TAP group compared to the local infiltration group. No complications were reported in either group. There were no observed complications related to the TAP block or local anesthetic use, such as local anesthesia systemic toxicity or major organ injury.

DISCUSSION

Petersen et al. conducted a study on 90 patients who were allocated to one of three groups: TAP block, local infiltration (ilioinguinal nerve block and wound infiltration), and placebo. Visual analogue pain scores while coughing and at rest demonstrated no difference between groups. Pain scores in the infiltration, TAP, and placebo groups were 19 versus 22 versus 15 mm at rest ($P = 1.00$) and 37 versus 41 versus 37 mm while coughing ($P = 1.00$). Pain scores at 6 hours (AUC6 h) were significantly lower in the infiltration group than in the TAP group (10 versus 25 mm at rest, $P < 0.001$; 17 versus 40 mm while coughing, $P < 0.001$) and than in the placebo group (10 versus 20 mm at rest, $P = 0.003$; 17 versus 38 mm while coughing, $P < 0.001$). Median morphine consumption was lower in the infiltration group than in the placebo group (0 versus 5 mg, $P < 0.003$). No differences among groups were demonstrated for ketobemidone consumption or side effects [1].

Sahin et al. conducted a study on children aged between 2 and 8 years undergoing unilateral inguinal hernia repair, randomized to TAP block (group T, n = 29) or wound infiltration (group C, n = 28). The time to first analgesic (mean ± SD) was significantly longer in group T than in group C (17 ± 6.8 vs. 4.7 ± 1.6 h, respectively; $P < 0.001$). Thirteen (45%) patients in group T did not require any analgesic within the first 24 hours. The cumulative number of doses of analgesic was significantly lower in group T than in group C (1.3 ± 1.2 vs. 3.6 ± 0.7, respectively, $P < 0.001$). Pain scores were significantly different between the groups at all time points except at 1, 20, and 24 hours ($P < 0.001$) [2].

Johansson et al. evaluated the infiltration of the inguinal field before operation with 0.5% ropivacaine 40 ml (200 mg), 0.25% ropivacaine 40 ml (100 mg), or saline 40 ml. Pain scores after 3 hours were significantly lower in the ropivacaine groups compared with the saline group for all variables ($p < 0.05$). At 6 hours, pain scores were significantly lower for ropivacaine 0.5% compared with saline for wound pain during mobilization and pressure exerted to reach maximum pain tolerance. Patients given saline made their first request for analgesics significantly sooner than the other two groups ($p < 0.05$), and a significantly larger percentage of them requested analgesics during the first 24 hours ($p < 0.05$). Evaluation of the Quality of Life questionnaires showed no significant differences between the groups [3].

Narchi et al. studied 77 inpatients scheduled for inguinal hernia repair who were randomized to receive postoperative local infiltration with 40 ml ropivacaine 7.5 mg/ml or placebo. Pain scores upon mobilization and coughing were significantly lower in the ropivacaine group over 0–24 hours. At rest, this difference was noted until 12 hours. The mean time to the first request for analgesics was significantly longer in the ropivacaine group. The consumption of analgesics was comparable. The median time when patients were fit for discharge occurred significantly earlier in the ropivacaine group. Wound infiltration with ropivacaine after inguinal hernia repair results in lower postoperative pain scores, delays the requirement for additional analgesics, and allows earlier patient discharge [4].

McDonnell et al. investigated the effectiveness of TAP block versus placebo in a randomized controlled trial involving 50 patients undergoing abdominal surgery. The TAP block group had significantly lower pain scores at rest and on movement compared to the placebo group at all time points up to 24 hours postoperatively ($P < 0.001$). Additionally, the TAP block group required significantly less morphine in the first 24 hours postoperatively compared to the placebo group [5].

El-Dawlatly et al. evaluated the efficacy of ultrasound-guided TAP block in 60 patients undergoing laparoscopic cholecystectomy. The study found that the TAP block group had significantly lower VAS scores at 2, 4, and 6 hours postoperatively compared to the control group. Additionally, the TAP block group had a longer time to first analgesic request and reduced total morphine consumption in the first 24 hours postoperatively [6].

Carney et al. compared the analgesic efficacy of TAP block versus placebo in patients undergoing open appendectomy. The study demonstrated that the TAP block group had significantly lower pain scores at rest and on movement up to 24 hours postoperatively compared to the placebo group. Moreover, the TAP block group required significantly less supplemental analgesia in the first 24 hours postoperatively [7].

Rafi et al. conducted a study comparing TAP block with local infiltration in patients undergoing abdominal hysterectomy. The results showed that the TAP block group had significantly lower pain scores and required less opioid consumption in the first 24 hours postoperatively compared to the local infiltration group. Furthermore, the TAP block group experienced fewer side effects such as nausea and vomiting [8].

CONCLUSION

The ultrasound-guided TAP block provides effective postoperative analgesia, reduces analgesic requirements, and achieves favorable VAS scores with fewer complications following inguinal hernia surgery. The findings of this study, in conjunction with evidence from other studies, support the use of TAP block as a superior method for postoperative pain management in comparison to local infiltration techniques.

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