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Original Research Article

A Comparative Research on Bupivacaine and Bupivacaine with Clonidine in Ultrasound Guided Transversus Abdominis Plane Block for Postoperative Analgesia after Laparoscopic Appendicectomy

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Abstract

Introduction: The study aimed to assess the efficacy of bupivacaine combined with clonidine, administered via ultrasonography-guided transversus abdominis plane (TAP) block, in providing postoperative analgesia following laparoscopic appendicectomy, aiming to improve pain management and patient outcomes.

Methods: The study employed computer-generated randomization to assign patients to treatment groups. Patients received detailed preoperative explanations. Standard assessments were conducted, including baseline VAS scores. Premedication was administered before induction. General anesthesia followed a consistent protocol. Bilateral ultrasound-guided TAP blocks were administered before surgery. Pain severity was assessed postoperatively using VAS scores.

Results: Total 60 members were included, 30 (100%) in each group. The mean ages were 30.87 ± 9.94 and 29.80 ± 8.63. Male female ratio was 0.9 and 0.7. Statistically there was no significant difference in age, gender, BMI, ASA status, mean surgery duration, VAS scores, respectively between groups. There was significant difference between the groups in mean time of analgesia,

Conclusion: Ultrasound-guided TAP block with bupivacaine plus clonidine provided superior and sustained analgesia compared to bupivacaine alone. Clonidine administration postoperatively significantly reduced hemodynamic parameters. Real-time imaging during the procedure prevented complications. Patients receiving bupivacaine plus clonidine required fewer analgesics over 24 hours, indicating its efficacy and safety in laparoscopic appendicectomy.

Keywords: Ultrasound-guided TAP Block, Bupivacaine, Clonidine, Analgesia, Laparoscopic Appendicectomy.

Introduction

Laparoscopic procedures, increasingly popular for both diagnostic and surgical purposes, provide patients with distinct advantages, [1] including reduced post-operative pain, faster recovery, minimized tissue damage and inflammation, and shorter hospital stays. Among the most common surgical interventions performed laparoscopically is laparoscopic appendectomy. [2]

Effective postoperative pain management is crucial for optimal patient care. [3] Common sources of postoperative pain include surgical wounds and visceral-peritonitic pain, often stemming from peritoneal inflammation. Transversus Abdominis Plane block, a regional anesthetic technique, can effectively block sensory nerve supply to the anterior abdominal wall. While opioids are typically used for pain relief, they can lead to adverse effects. Therefore, alternative regimens that reduce opioid reliance are beneficial for improving patient outcomes. [3]

Combining adjuvant medications with local anesthetics reduces dosage requirements, enhances analgesic efficacy, and minimizes adverse effects. Clonidine, an alpha-2 adrenergic agonist, accelerates onset, improves block effectiveness, and prolongs postoperative pain relief when used with local anesthetics. [4] Ultrasound-guided TAP blocks mitigate complications by enabling precise

needle placement and visualization of nerve distribution. The objective of this study was to evaluate the efficacy of bupivacaine combined with clonidine, administered via ultrasonography-guided transversus abdominis plane (TAP) block, in providing postoperative analgesia following laparoscopic appendicectomy.

Methods

It was a prospective, randomised, double-blind study, conducted in the department of Anaesthesia, GSL Medical College, Rajahmundry. Study was conducted between November 2020 to February 2022. Study protocol was approved by the Institutional Ethics Committee. Informed written consent was taken from the study members.

The inclusion criteria comprised ASA grades I and II, aged between 18 and 60, scheduled for laparoscopic appendicectomy, and possessing a BMI ranging from 18 to 24. The exclusion criteria encompassed unwillingness, history of chronic pain necessitating regular analgesic use, known drug allergies, mental handicap, and localized infection.

The study employed a random assignment process using a computer-generated table to allocate selected patients into treatment groups. Patients received thorough explanations of the anesthetic procedure in their native language. Preoperative assessments, including measurements, physical examinations, and system evaluations, were conducted the day before surgery. Standard diagnostic tests were performed, and baseline visual analogue scale (VAS) scores were recorded for pain assessment. [5]

Patients were unaware of their assigned groups. Premedication with Glycopyrolate 0.2mg IM was administered 30 minutes before induction. In the operating theatre, venous access was established, and baseline vital signs were recorded. General anesthesia was induced consistently for all patients, with intramuscular injections of Fentanyl 2 mcg/kg and Midazolam 1 mg/kg followed by propofol induction and intubation. Anesthesia maintenance included Vecuronium 0.08mg/kg, Sevoflurane 1MAC, oxygen, and air. Bilateral ultrasound-guided TAP blocks were administered before neuromuscular blockade reversal, using either 15 milliliters of 0.25 percent bupivacaine for group A or 15ml 0.25 percent bupivacaine with 1mcg/kg clonidine for group B. Reversal was achieved with neostigmine and glycopyrrolate injections. Patients were then transferred to the recovery room and assessed at specific intervals for pain severity using VAS scores.

Statistical analysis: Statistical analysis was performed by using SPSS software version 20.0 and MS excel-2007. Descriptive data were tabulated as mean ± standard deviation and percentages. Data were also tabulated and graphically represented. The Chi-square test was used to assess the association among various categorical variables. For all statistical analyses $P<0.05$ was considered statistically significant.

Results

Total 60 members were included, 30 (100%) in each group. The mean ages were 30.87 ± 9.94 and 29.80 ± 8.63. Male female ratio was 0.9 and 0.7. Statistically there was no significant difference in age, gender, BMI, ASA status, mean surgery duration, VAS scores, respectively between groups. There was significant difference between the groups in mean time of analgesia,

Discussion

This study investigated the postoperative pain relief efficacy of bupivacaine alone and bupivacaine combined with clonidine in TAP blocks guided by ultrasonography for appendicectomy. The primary finding revealed a significantly prolonged time to analgesia requirement in the clonidine (dexmedetomidine) group compared to the bupivacaine-only group. Initial pain scores in the clonidine group were higher than those in the bupivacaine group but significantly decreased by the second hour, with no difference observed thereafter. Tramadol consumption and the need for rescue analgesia within 24 hours post-surgery showed no significant differences between groups. These results suggest that while the addition of clonidine initially may lead to higher pain scores, it ultimately provides effective pain relief comparable to bupivacaine alone without increasing the need for rescue analgesia.

The mean ages were 30.87 ± 9.94 and 29.80 ± 8.63m, respectively in the groups. Dhupia R et al. [6] found mean ages of 46.59+5.2 years for group A and 45.1+3.4 years for group B. Acharya R et al. [7] reported mean ages of 25.3+3.22 years for group A and 25.8+3.18 years for group B. Arora R et al. [8] observed mean ages of 45.12+16.8 years for group A and 46+18.07 years for group B, with no significant difference.

Group A patients underwent surgery for an average of 131.53 ± 36.76 minutes, while Group B patients had an average surgical duration of 129.47 ± 38.69 minutes, with no statistically significant difference (P value 0.833). Arunkumar et al. [9] reported average surgical times of 88.3+23.6 minutes for group A and 95.3+23.99 minutes for group B. Conversely, Bollag L et al. [10] found shorter surgical times of 39+10 minutes for group A. Kanazi GE et al. [11] noted no significant differences in surgical durations (54+22 min for group A and 77+48 min for group B). Other studies similarly reported comparable surgical durations

between groups, indicating no significant differences. [7, 12]

Baseline and hourly VAS scores were collected throughout the study. At 6, 12, and 18 hours, group B exhibited significantly higher mean VAS scores than group A (P<0.05). Mir TA et al. [13] found group II had better analgesia quality than group I (P=0.0005). Conversely, Dhupia R et al. [6] noted significant differences at 2, 4, and 6 hours, but not at 12 and 24 hours. Raghukumar et al. [14] reported similar VAS scores among groups B, C, and D up to 8 hours.

Sedation scores were collected at various intervals throughout the study. Group B consistently exhibited significantly higher sedation scores than group A (P<0.05). Mir TA et al. [13] found that none of the participants fell into deep sleep, with varying degrees of sedation observed. Sruthi BM et al. [12] reported higher sedation scores (>3) in group B compared to Group A. Dhupia R et al. [6] noted significant differences in sedation scores between groups. Prasath AK et al. [15] found that the bupivacaine-with-clonidine group achieved higher sedation scores than the bupivacaine-only group, indicating clonidine's considerable sedative impact.

In the current study, group B patients experienced significantly longer analgesia duration compared to group A (P <0.0001), with mean hours of 17.73 ± 2.66 and 11.10 ± 1.75, respectively. Time to first rescue analgesia was significantly longer in group B than group A (P=0.0001), averaging 14.23±4.73 and 6.38±2.56 hours, respectively. Other studies reported similar findings, with group B consistently demonstrating prolonged analgesia duration compared to group A. [6, 8, 16]

Ultrasound-guided TAP block with bupivacaine plus clonidine provided superior and sustained analgesia compared to bupivacaine alone. Clonidine administration postoperatively significantly reduced hemodynamic parameters. Real-time imaging during the procedure prevented complications. Patients receiving bupivacaine plus clonidine required fewer analgesics over 24 hours, indicating its efficacy and safety in laparoscopic appendicectomy.

References:

1. Smiley KE, Wuraola F, Mojibola BO, Aderounmu A, Price RR, Adisa AO. An Outcomes-Focused Analysis of Laparoscopic and Open Surgery in a Nigerian Hospital. JSLS. 20 23; 27(1): e2022.00081.
2. Kosuke Hiramatsu, Shigeo Toda, Tomohiro Tate, Yudai Fukui, et al. Can laparoscopic appendectomy be safely performed by surgical residents without prior experience of open appendectomy? Asian Journal of Surg. 2018; 41: 270 – 3.
3. C Small, H Laycock, Acute postoperative pain management. *British Journal of Surgery*. 2020; 107: e70 – e80.
4. Brummett CM, Williams BA. Additives to local anesthetics for peripheral nerve blockade. Int Anesthesiol Clin. 2011; 49(4): 104 – 16.
5. Shukla BB, Malviya D, Kumar S, Misra S, Kumar S, Parashar S. Comparative evaluation of visual analogue scale and pupillary diameter for post-operative pain: An observational study. Indian J Anaesth. 2023; 67: S93 – S98.
6. Dhupia R, Jain S, Sahani IS, Modi V, Romday R, Kothari A. Effect of adding various doses of clonidine as an adjunct in Transversus abdominis plane block in unilateral inguinal hernioplasty. International Surgery Journal. 2017; 4 (12): 4039 – 42.
7. Acharya R, Baksi R, Mohapatra P. Comparative Analysis of Duration of Postoperative Analgesia between Levobupivacaine and Levobupivacaine with Clonidine after Ultrasound-Guided Transversus Abdominis Plane Block in Patients Undergoing Lower Segment Cesarean Section. Anesthesia, Essays and Researches. 2018; 12(4): 943 – 8.
8. Arora R, Pandey V, Sodhi GS, Mohindra BK. A Comparative Study of Intrathecal Bupivacaine and Bupivacaine with Different Doses of Clonidine in Lower Limb Surgeries. Anesth Essays Res. 2018; 12(2): 412 – 6.
9. Arunkumar S, Hemanth Kumar VR, Krishnaveni N, Ravishankar M, Jaya V, Aruloli M. Comparison of dexmedetomidine and clonidine as an adjuvant to ropivacaine for epidural anesthesia in lower abdominal and lower limb surgeries. Saudi J Anaesth 2015; 9: 404 – 8,
10. Bollag L, Richebe P, Siaulys M, Ortner CM, Gofeld M, Landau R. Effect of transversus abdominis plane block with and without clonidine on post-cesarean delivery wound hyperalgesia and pain. Reg Anesth Pain Med. 2012; 37(5): 508 – 14.
11. Kanazi GE, Aouad MT, Jabbour-Khoury SI, et al. Effect of low-dose dexmedetomidine or clonidine on the characteristics of bupivacaine spinal block. Acta Anaesthesiol Scand. 2006; 50(2): 222 – 7.
12. Sruthi BM, Reddy GS, Jyothsna G. Transversus abdominis plane block: Comparison of efficacy of varying doses of clonidine combined with levobupivacaine–A double-blind randomized trail. Anesthesia, essays and researches. 2019; 13(1):179.
13. Mir TA, Mir AH, Gani TT, Yousuf A, Ahmad SI. Evaluation of efficacy of bupivacaine and bupivacaine plus clonidine in transversus abdominis plane (TAP) block for postoperative

analgesia: a prospective, randomized, double blind comparative study. Int J Res Med Sci 2017; 5: 4588 – 94.
14. Raghukumar M, Majigoudar SS. A randomized clinical comparative trial to study the efficacy of adding clonidine or dexamethasone to bupivacaine (0.5%) in prolonging the duration of post operative analgesia with ultrasound guided TAP block in cesarean delivery. Indian J Clin Anaesth. 2017; 4(2): 198 – 201.
15. AK Prashath, Bhure A, Neelakshi K, Prasad I. Comparative study of intrathecal hyperbaric bupivacaine with clonidine, fentanyl and midazolam for quality of anesthesia and duration of post-operative pain relief in patients undergoing elective cesarean section. People's journal of scientific research. 2012; 5(1): 19 – 23.
16. Almarakbi WA, Kaki AM. Addition of dexmedetomidine to bupivacaine in transversus abdominis plane block potentiates postoperative pain relief among abdominal hysterectomy patients: A prospective randomized controlled trial. Saudi journal of anaesthesia. 2014; 8(2): 161.