COMPARISON BETWEEN KETAMINE AND NEOSTIGMINE AS ADJUVANTS TO BUPIVACAINE IN ULTRASOUND-GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK IN CAESAREAN SECTION

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Introduction

Caesarean section (CS) requires effective postoperative pain management to enhance maternal comfort, facilitate early mobilization, and reduce complications such as thromboembolic events and impaired maternal-infant bonding. While systemic opioids have traditionally been used, their adverse effects have led to the adoption of multimodal analgesia, including regional techniques like the transversus abdominis plane (TAP) block. TAP blocks provide targeted analgesia by delivering local anesthetics between the internal oblique and transversus abdominis muscles, reducing systemic drug exposure. However, their duration is limited to 12–24 hours with plain bupivacaine. To prolong analgesia, adjuvants such as ketamine and neostigmine are increasingly used. Ketamine, an NMDA receptor antagonist, prevents hyperalgesia and central sensitization, while neostigmine, an acetylcholinesterase inhibitor, enhances cholinergic neurotransmission to extend analgesic effects. This study evaluates the efficacy and safety of these adjuvants in TAP blocks for CS, focusing on pain relief, duration of analgesia, opioid-sparing effects, and patient outcomes. , spondylolisthesis, recurrent disc herniation, spinal stenosis, and fractures.

Aim of the work

The primary objective of this study was to compare the efficacy of ketamine and neostigmine as adjuvants to bupivacaine in ultrasound-guided TAP blocks for elective CS, with a focus on postoperative pain intensity and analgesia duration. Secondary objectives included assessing differences in rescue opioid consumption, patient satisfaction, and the incidence of complications such as haemodynamic instability or side effects.

Patients and Methods

This prospective, double-blind, randomized controlled trial included 80 ASA I-II multiparous women scheduled for elective Caesarean section (CS) at El-Shatby University Hospital. Exclusion criteria included emergency CS, BMI >35 kg/m², coagulopathy, neuropathy, chronic pain conditions, or allergies to study medications. Participants were randomly assigned to two groups: Group K (n=40) received bilateral transversus abdominis plane (TAP) blocks with 0.25% bupivacaine and 0.5 mg/kg ketamine per side, while Group N (n=40) received 0.25% bupivacaine with 500 µg neostigmine per side. All patients underwent standardized spinal anesthesia with hyperbaric bupivacaine (12.5 mg) and postoperative care, including IV paracetamol every 8 hours. Ultrasound-guided TAP blocks were performed bilaterally using a linear transducer.

Haemodynamic parameters and pain scores (VAS 0–10) were assessed preoperatively, intraoperatively, and at multiple intervals up to 24 hours postoperatively. Rescue analgesia (nalbuphine 6 mg IV) was provided for VAS scores ≥4. The study analyzed analgesia duration, total nalbuphine consumption, patient satisfaction (Excellent/Good/Fair/Poor), and complications using statistical tests.

Results

Demographic variables, including age, BMI, and surgical duration, were comparable between groups (p >0.05). Intraoperative haemodynamics remained stable in both groups. Postoperatively, Group K exhibited significantly lower heart rates and mean arterial blood pressure at 18 and 24 hours (p <0.001)
(Figure 1). Pain scores favoured Group K, with significantly lower VAS values at 12 hours (1.7 vs. 3.38), 18 hours (1.75 vs. 3.89), and 24 hours (2.2 vs. 2.53; p <0.001) (Figure 2). The mean duration of analgesia was longer in Group K (20.58 ± 2.70 hours vs. 16.05 ± 4.11 hours; p <0.001), and rescue nalbuphine requirements were nearly 60% lower in Group K (4.05 ± 4.97 mg vs. 10.0 ± 6.05 mg; p <0.001). Patient satisfaction was high in both groups, with 50% of Group K and 55% of Group N rating their experience as “Excellent,” though no statistical difference was observed (p=0.47) (Table 1). Complications were minimal, with hypotension occurring in 5% of Group K and 7.5% of Group N, and nausea reported in 2.5% of Group K (Table 2).

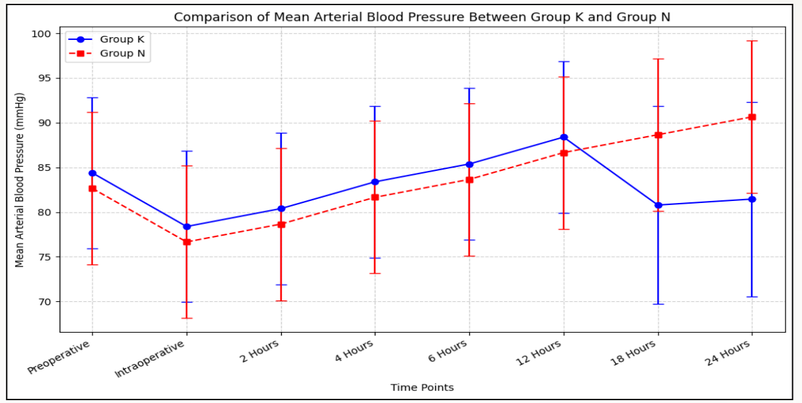

Figure (1): Comparison of MABP between both study groups.

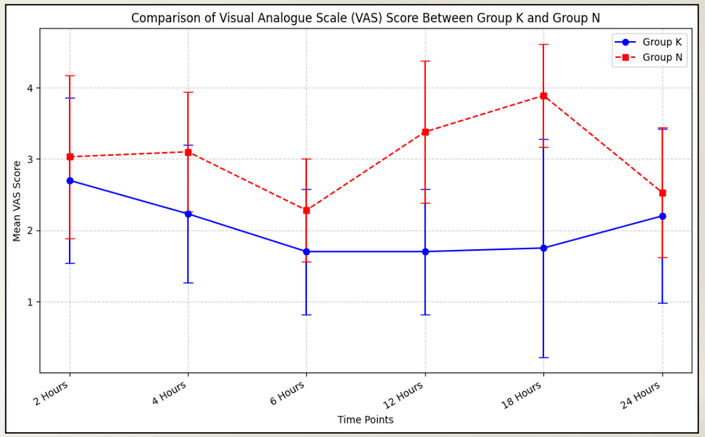

Figure (2): Comparison of VAS scores between both study groups.

Conclusion

The results of this study suggest that both ketamine and neostigmine are safe and effective adjuvants to bupivacaine in transversus abdominis plane block (TAPB). However, ketamine demonstrated superior efficacy in prolonging the duration of analgesia compared to neostigmine. Additionally, the use of either adjuvant was associated with high patient satisfaction, indicating their potential role in optimizing postoperative pain management for Caesarean section patients.