



## **Effect of Magnesium sulfate on Ropivacaine under Ultrasound-Guided TAP Block in post- Cesarean Section patients**

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### **Abstract**

**Background and Aims:** Post-Cesarean Section pain varies from moderate to severe and TAP (transverse abdominis plane) block has been used to manage the postoperative pain in abdominal surgeries but its effect of analgesia is of variable duration. Magnesium sulfate used as an adjuvant with local anesthetics in central neuroaxial and peripheral nerve blocks to prolong the analgesic effect. Our study is aimed to evaluate the effects of addition of magnesium sulfate to ropivacaine in the transverse abdominis plane block in post-cesarean section patients.

**Methods:** This is double blind, randomized, clinical trial, conducted on 60 patients of ASA class I-II undergoing elective LSCS under spinal anaesthesia. Ultrasound-guided bilateral transverse abdominis plane (TAP) blocks administered after skin closure. Patients with bleeding disorders, sensitivity to the local anesthetics and magnesium sulfate, infection at site of injection were excluded. The patients were equally allocated into two groups, the group A (19 ml ropivacaine 0.2% with 1 ml normal saline), and the group B (19 ml ropivacaine 0.2% with 1 ml magnesium sulfate 500 mg), a total volume of 20 ml administered on each side. The patients'

characteristics, the level of pain score (visual analogue scale = VAS), rescue analgesic demand (Injection Diclofenac I.V. infusion), and complications if any were evaluated at 2, 6, 12, and 24 hours in postoperative period in the two groups.

**Results:** The mean VAS scores of the patients two hours after surgery (the first post-block measurement) in A and B groups were  $2.8 \pm 0.6$  and  $2.6 \pm 0.5$  respectively. The scores reached  $3.0 \pm 0.8$  and  $2.7 \pm 0.8$  within the next 24 hours, respectively. Although the pain scores were generally lower at all hours in the B group, but it was not statistically significant. The rescue analgesic consumption increases with time in both groups though it was less in the group B than in group A at two hours after the block; however, it was not statistically significant. No complications were noted in both the groups.

**Conclusions:** Results of our study showed that by adding magnesium sulfate to ropivacaine in TAP block does not prolong the duration of analgesia in post-Cesarean Section patients.

**Keywords:** Cesarean Section, Postoperative Pain, Ultrasound-Guided-TAP block, Magnesium Sulfate, Ropivacaine.

## **Introduction**

Managing pain following cesarean section is challenging. The analgesic regimen should be effective, safe, and devoid of side effects<sup>1</sup>. Post-cesarean section pain is one of the postoperative complications. Pain along with nausea, vomiting, and drowsiness, is one of the three most common causes of patient's delayed discharge<sup>2</sup>. A various techniques are used to provide better pain management, including systemic analgesics, patient-controlled analgesia, and peripheral analgesic procedures<sup>3</sup>. Opioids administration is associated with several systemic complications. Thus, inclination to perform peripheral analgesic procedures such as transverse abdominis plane block is recently increased<sup>4, 5</sup>.

Transverse abdominis plane (TAP) block was studied for its effectiveness as multimodal analgesia in various surgeries like cesarean section, hysterectomy, prostatectomy, colonic surgery and laparoscopy, and even in many pediatric surgical procedures<sup>6-11</sup>. The pharmacokinetics properties of the administered drugs and technique of TAP block have the effect on duration of analgesia. Many measures have been tried to increase the duration of analgesia in TAP block, like by placing the catheter in-situ and use of adjuvant drugs<sup>12</sup>. Many studies have been done to evaluate the effect of magnesium sulfate in management of postoperative pain<sup>13, 14</sup>. To our knowledge no study has been done to evaluate the effect of Magnesium Sulfate as an adjuvant in TAP Block in post-cesarean section. The study was aimed to evaluate the effect of Magnesium sulfate on Ropivacaine under Ultrasound-Guided TAP Block in post- Cesarean Section patients and its adverse reactions if any.

**Methods:** After obtaining approval from the Institute's Ethics Committee and informed consent, a double-blind, randomized, clinical trial, 60 parturient patients with American Society of Anesthesiologists class I-II, posted

for Elective LSCS under Spinal Anesthesia were enrolled in the study. Patients with bleeding disorders, sensitivity to the local anesthetics and magnesium sulfate, morbidly obese, refusal for the block, infection at injection site were excluded.

Patients were randomized by sealed envelope technique to undergo Ultrasound-guided TAP block with 19 mL ropivacaine 0.2% with 1 mL magnesium sulfate 500 mg in study group(B), and 19 mL ropivacaine 0.2% with 1 mL normal saline 0.9% in the control group (A). The random number table was used to generate the allocation sequence. The patients, anesthesiologists and staff were blinded to the allotment. All patients received spinal anesthesia with 0.5% Hyperbaric Bupivacaine 10 mg. The bilateral block was performed after skin closure under multipara monitoring with ultrasound guidance (HITACHI ALOKA F37 ultrasound machine) using a high frequency linear probe with a needle in-plane technique block was performed using B-Braun, 22G, 90 mm needle, which was inserted between the mid and anterior axillary line, extending below the rib line to highest point of the iliac crest, at the level of the abdominal incision. To evaluate the severity of pain, a visual analogue scale (0: no pain and 10: the worst pain) was used to record the patient's pain at rest and with movement at 2, 6, 12, and 24 hours in postoperative period by a person, blinded of group assignment. Patient with VAS score of more than 3 received rescue analgesia (Injection diclofenac 75 mg IV). A questionnaire was done to record the Rescue analgesic consumption, complications if any. The data were analyzed with SPSS version 18. The qualitative and quantitative data were evaluated using chi-square tests and independent t, respectively, and the P value of less than 0.05 was considered statistically significant.

## **Results**

The patients' details in the two groups (age and weight)

were not significantly different (Table 1). The mean (VAS) pain scores of the patients at the second hour after surgery (the first post-block measurement) were  $2.8 \pm 0.6$  and  $2.6 \pm 0.5$  hour after surgery in A and B groups, this indicated no significant difference between the two groups, but decreased gradually thereafter and at the 24-hour it reached  $3.0 \pm 0.8$  and  $2.7 \pm 0.8$  in the control and study groups, respectively. Though the mean pain score was less in the group B than in the group A at all hours of the study, there was no significant difference regarding the rate of pain score between the two groups (Table 2). The amount of rescue analgesic consumption (Injection diclofenac IV infusion) gradually increased during the study hours until it reached its highest level at 12 hours; no significant difference was observed between the two groups at any hours of the study, however (Table 2), No patients experienced any adverse effects, including nausea, vomiting, burning sensation, and sedation.

Table 1. Demographic Data

Demographic data	Group A	Group B	P Value
Age, years	$22.7 \pm 10$	$23.4 \pm 11$	0.7981
Weight, kg	$50.9 \pm 12$	$53.6 \pm 7$	0.2917

Table 2. VAS Pain Score

VAS Score (hour)	Group A	Group B	P values
2 <sup>nd</sup>	$2.8 \pm 0.6$	$2.6 \pm 0.5$	0.1662
6 <sup>th</sup>	$2.9 \pm 0.5$	$2.7 \pm 0.7$	0.2081
12 <sup>th</sup>	$3.3 \pm 1.04$	$3.2 \pm 0.7$	0.6645
24 <sup>th</sup>	$3 \pm 0.8$	$2.7 \pm 0.8$	0.1519
Total Rescue analgesic consumption in 24 hours	28(46.6)	28(46.6)	0.580

Values represented as Mean  $\pm$  SD or No. (%).

## Discussion

Results of our study demonstrated that the addition of magnesium sulfate to ropivacaine, in TAP block after cesarean section, there is no statistically significant difference between two groups with respect to the pain score and the amount of rescue analgesic consumption.

Many clinical trials have been done in recent years to increase the effectiveness of TAP block in management of post operative pain. Magnesium sulfate is used as an adjuvant to prolong the duration of analgesia because of its regulating effect on calcium influx into the cell and central nervous system N-methyl-D-aspartate (NMDA) receptors antagonizing property<sup>17</sup>.

In a systematic review performed on 9 studies which were evaluated the efficacy of TAP block in decreasing postoperative pain scores and opioid consumption in cesarean delivery, its effectiveness was observed in all the studies. The group which received intrathecal morphine showed better postoperative analgesia but with increase rate of side effects<sup>15</sup>. Pain in Cesarean section patients is both visceral and somatic, which is better managed by intrathecal morphine than TAP Block which relieves only somatic pain. Our study differs from mentioned studies with respect to the drug dosage, the block quality, and the way of performance.

Systematic review of many studies, demonstrated the superiority of TAP block over other techniques to manage the postoperative pain<sup>6-10, 12</sup>. But researchers recommended further studies on how to perform the block, the dosage of medications administered, and the use of adjuvant drugs to prolong postoperative analgesia in various surgical procedures<sup>18</sup>.

The analgesic effect of systemic magnesium sulfate on postoperative pain, reduction of opioid consumption was evaluated in meta-analysis, showed that all groups receiving magnesium sulfate had reduction in pain score on the first postoperative day without any adverse effects

with no difference in modes of administration whether bolus or continuous infusion<sup>17</sup>.

Xiao F et al and Faiz SHR et al in their study demonstrated the synergistic effect of magnesium sulfate with intrathecal bupivacaine and lidocaine for postoperative pain and shivering<sup>14, 21</sup>.

Haghighi et al, in their study demonstrated that reduction in pain score and postoperative opioids consumption by adding magnesium sulfate to lidocaine as continuous infusion in the axillary block<sup>22</sup>.

Rana et al. in their study showed that reduction in pain score and rescue analgesic consumption with prolong duration of analgesia in patients undergoing abdominal hysterectomy under intrathecal anesthesia, with TAP block (18 ml Bupivacaine 0.25% alone or in combination with 150 mg magnesium sulfate)<sup>23</sup>. This is contrast to present study with respect to pain score and rescue analgesic consumption. This could be explained by types of the administered local anesthetics in the TAP block (Ropivacaine vs Bupivacaine), and type of surgery (Cesarean section vs Hystrectomy). With regard to technique, the site of needle insertion in our study was close to the mid axillary line while it was in the anterior axillary line in their study. In current study, pain was measured both at rest and during movement, while in their study the type of pain was not mentioned.

To the best of our knowledge, ours is the first study to evaluate the effect of Magnesium sulfate on ropivacaine under Ultrasound Guided TAP Block in post –cesarean section patients. Although the study did not show any statistically significant increase analgesic duration on addition of magnesium sulfate to ropivacaine, it is recommended that further studies to be conducted with different doses of the drug and with other adjuvant drugs.

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