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Ultrasound-guided transversus abdominis plane block with bupivacaine and ropivacaine as adjuncts for postoperative analgesia in laparoscopic cholecystectomies- A Comparative study

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ABSTRACT

Background: To compare ultrasound-guided transversus abdominis plane block with bupivacaine and ropivacaine as adjuncts for postoperative analgesia in laparoscopic cholecystectomies.

Methods: Ninety patients scheduled for laparoscopic cholecystectomy, were divided into 2 groups of 45 each. Both groups got ultrasound-guided TAP blocks with 0.25% bupivacaine (plain) in group I and 0.375% ropivacaine (plain) in group II. All patients were evaluated for post-operative pain and rescue analgesic usage at time intervals of 10 minutes, 30 minutes, 1 hour, 4 hours, 8 hours, 12 hours, and 24 hours.

Results: Group I comprised of 20 males and 25 females and group II had 21 males and 24 females. The mean weight in group I was 68.2 kgs and in group II was 65.2 Kgs. The mean height was 159.2 cms in group I and 157.4 cms in group II. The mean duration of surgery was 72.4 minutes in group I and 75.6 minutes in group II. The difference was non- significant (P> 0.05). The mean pain score at 10 minutes was 0 in both groups. At 30 minutes, it was 1.68 in group I and 0.0 in group II. At 1 hour was 2.9 in group I and 0.0 in group II. At 4 hours was 2.1 in group I and 2.4 in group II. At 8 hours was 2.1 in group I and 2.4 in group II. At 12 hours was 1.5 in group I and 2.2 in group II. At 24 hours was 1.1 in group I and 1.3 in group II. The difference was significant (P< 0.05).

Conclusion: When compared to bupivacaine 0.25%, ultrasound-guided deposition of ropivacaine 0.375% in the TAP provided more analgesia in the early post-operative period in patients having laparoscopic cholecystectomy.

Keywords: Laparoscopic cholecystectomy, Ropivacaine, Bupivacaine

INTRODUCTION

Cholelithiasis, commonly known as gallstones, refers to the formation of solid deposits or stones in the gallbladder or bile ducts. The formation of gallstones typically occurs when there is an imbalance in the substances that make up bile, such as cholesterol, bilirubin, and calcium salts.[1] There are several types of gallstones, including cholesterol stones (the most common type) and pigment stones (composed of bilirubin). While the exact cause of gallstone formation is not fully understood, several risk factors have been identified.[2] Women are more prone to developing gallstones than men, especially those who are pregnant, on hormone therapy, or taking birth control pills. The risk of gallstones increases with age, particularly after the age of 40. Being overweight or obese increases the risk of developing gallstones. Losing weight too quickly, whether through

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dieting or surgery, can contribute to gallstone formation. A high-fat, low-fibre diet is associated with an increased risk of gallstones.[3]

Laparoscopic cholecystectomy is recognised as a safe and effective procedure for the majority of patients who require gallbladder removal.[4] Pain management strategies for laparoscopic cholecystectomy patients have included non-steroidal anti-inflammatory drugs, opioids (intravenous [IV] patient-controlled analgesia), local anaesthetic (LA) infiltration, thoracic epidural block, and multi-modal analgesia.[5]

Transversus abdominis plane (TAP) block blocks abdominal neural afferents by placing LA in the neurofascial plane that is situated between the internal oblique and transversus abdominis muscles. The TAP block is now acknowledged as a crucial therapy for reducing post-operative pain following abdominal surgery because to the growing use of ultrasound guidance for more accurate TAP localisation.[6] The present study compared ultrasound-guided transversus abdominis plane block with bupivacaine and ropivacaine as adjuncts for postoperative analgesia in laparoscopic cholecystectomies.

MATERIALS AND METHODS

We selected ninety American Society of Anesthesiologists physical status I/II patients aged 18–65 years who underwent laparoscopic cholecystectomy of either gender. All patients gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were classified into 2 groups of 45 each. Group I patients underwent ultrasound-guided TAP block with 0.25% bupivacaine (plain) and group II patients underwent ultrasound-guided TAP block with 0.375% ropivacaine (plain). Parameters such as the consumption of rescue analgesics and post-operative pain at 10 minutes, 30 minutes, 1 hour, 4 hours, 8 hours, 12 hours, and 24 hours was recorded. Results thus obtained were analysed statistically. P value < 0.05 was considered significant.

RESULT

Table I Distribution of patients

Groups	Group I	Group II
Agent	0.25% bupivacaine	0.375% ropivacaine
Male: Female	20:25	21:24

Group I comprised of 20 males and 25 females and group II had 21 males and 24 females (Table I).

Table II Comparison of parameters in both groups

Parameters	Group I	Group II	P value
Weight (Kg)	68.2	65.2	0.91
Height (cm)	159.2	157.4	0.94
Duration of surgery (mins)	72.4	75.6	0.80

The mean weight in group I was 68.2 kgs and in group II was 65.2 Kgs. The mean height was 159.2 cms in group I and 157.4 cms in group II. The mean duration of surgery was 72.4 minutes in group I and 75.6 minutes in group II. The difference was non- significant (P> 0.05) (Table I).

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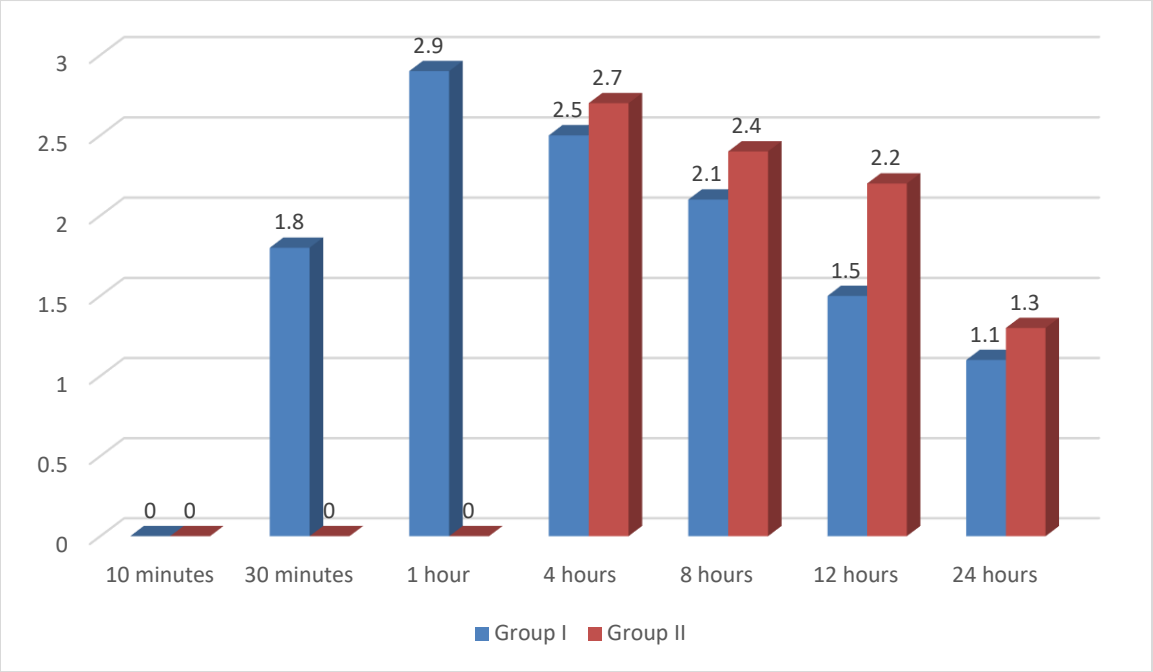
Table III Post-operative pain scores

Time period	Group I	Group II	P value
10 minutes	0	0	0.05
30 minutes	1.8	0	
1 hour	2.9	0	
4 hours	2.5	2.7	
8 hours	2.1	2.4	
12 hours	1.5	2.2	
24 hours	1.1	1.3	

The mean pain score at 10 minutes was 0 in both groups. At 30 minutes, it was 1.68 in group I and 0.0 in group II. At 1 hour was 2.9 in group I and 0.0 in group II. At 4 hours was 2.1 in group I and 2.4 in group II. At 8 hours was 2.1 in group I and 2.4 in group II. At 12 hours was 1.5 in group I and 2.2 in group II. At 24 hours was 1.1 in group I and 1.3 in group II. The difference was significant (P< 0.05) (Table III, Graph I).



Graph I Post-operative pain scores

DISCUSSION

In many cases, gallstones do not cause any symptoms and are discovered incidentally during imaging tests for unrelated conditions. However, if a gallstone obstructs the bile ducts or causes inflammation of the gallbladder (cholecystitis).[7] Typically, the pain occurs in the upper right part of the abdomen and may radiate to the back or right shoulder. Treatment for cholelithiasis might be required if symptoms show up or if complications, including an infection or pancreatitis, develop.[8] The procedure known as a cholecystectomy, which removes the gallbladder, is the most popular form of treatment. Traditional open surgery or minimally invasive laparoscopic methods

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can be used to accomplish this. Since bile still passes from the liver into the small intestine after gallbladder removal, most people are able to lead regular lives without one.[9]

During laparoscopic cholecystectomies, the local anaesthetic medications bupivacaine and ropivacaine can both be added for postoperative analgesia. There are several ways to provide local anaesthetics, including epidural, intrathecal, and wound infiltration.[10] By stopping the brain from receiving pain signals from the surgical site, bupivacaine and ropivacaine, when given as wound infiltration, can successfully relieve pain during laparoscopic cholecystectomy. Studies have shown that using bupivacaine and ropivacaine as postoperative analgesic adjuncts in laparoscopic cholecystectomies can reduce the need for opioids and other medicines, as well as postoperative pain scores and patient satisfaction with pain management. Using local anaesthetics for postoperative analgesia can have a number of drawbacks, including toxicity, allergic reactions, and nerve damage.[11,12] Therefore, the use of bupivacaine and ropivacaine as adjuncts for postoperative analgesia during laparoscopic cholecystectomies should be thoroughly scrutinised and supervised by a qualified healthcare provider.[13,14] We compared ultrasound-guided transversus abdominis plane block with bupivacaine and ropivacaine as adjuncts for postoperative analgesia in laparoscopic cholecystectomies.

Our study showed that group I comprised of 20 males and 25 females and group II had 21 males and 24 females. Baaj et al[15] in their study, 40 patients who were undergoing postoperative caesarean deliveries under spinal anaesthesia with bupivacaine and fentanyl were evaluated for the effectiveness of TAP block for postoperative analgesia. After the procedure, they received a bilateral ultrasound-guided TAP block using either bupivacaine 0.25% (B group) or saline (S group, or placebo group) on 20 patients. i.v. morphine was then administered as the sole form of patient-controlled analgesia. 24 hours following delivery, each patient underwent an evaluation for pain, morphine consumption, nausea, vomiting, sedation, patient satisfaction, as well as pain relief during mobilisation (24 hours post-caesarean section). Each of the 40 participants finished the research. The bupivacaine group also reported increased satisfaction with their pain treatment over 24 hours following surgery, lower morphine intake, and a more than 60% reduction in total morphine consumption.

The mean weight in group I was 68.2 kgs and in group II was 65.2 Kgs. The mean height was 159.2 cms in group I and 157.4 cms in group II. The mean duration of surgery was 72.4 minutes in group I and 75.6 minutes in group II. In 60 patients undergoing elective laparoscopic cholecystectomy who received either an ultrasound-guided TAP block with either 0.25% bupivacaine (Group I, n = 30) or 0.375% ropivacaine (Group II, n = 30), Sinha et al[16] compared the effectiveness of bupivacaine and ropivacaine for post-operative analgesia. All patients had their post-operative pain and use of rescue analgesics assessed at 10, 30, 1, 1, 4, 8, 12, and 24 hours. Patients receiving the ultrasound-guided TAP block with ropivacaine (Group II) experienced significantly less pain than those who received the block with bupivacaine (Group I) at 10 min, 30 min, and 1 h. However, the effects of both drugs were the same.

The mean pain score at 10 minutes was 0 in both groups. At 30 minutes, it was 1.68 in group I and 0.0 in group II. At 1 hour was 2.9 in group I and 0.0 in group II. At 4 hours was 2.1 in group I and 2.4 in group II. At 8 hours was 2.1 in group I and 2.4 in group II. At 12 hours was 1.5 in group I and 2.2 in group II. At 24 hours was 1.1 in group I and 1.3 in group II. In Carney et al.'s[17] clinical study of non-laparoscopic gynaecological surgeries, 0.375% ropivacaine was used for TAP block; the reported pain scores were lower when compared to the patients who did not receive TAP block; higher VAS scores were observed when 0.75% of ropivacaine was used in TAP block; this was attributed to a distinct pain profile in the extensive "open" surgical wound.

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In McDermott et al.'s[18] study, 36 patients who had undergone a bilateral TAP block after a typical anatomic landmark-based treatment were examined. After the anesthesiologist had inserted the needle, ultrasonography was used to determine the needle tip's location. Additionally, the needle tip was discovered intramuscularly or subcutaneously in 58% of the cases. Only 25% of the injections, according to the authors, were in the correct intermuscular plane.

CONCLUSION

When compared to bupivacaine 0.25%, ultrasound-guided deposition of ropivacaine 0.375% in the TAP provided more analgesia in the early post-operative period in patients having laparoscopic cholecystectomy.

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