

# Comparison of intraperitoneal bupivacaine alone or with dexmedetomidine or tramadol for post-operative analgesia following laparoscopic cholecystectomy

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## Abstract

**Introduction:** This study was conducted to evaluate the effect of Intraperitoneal Bupivacaine alone or with dexmedetomidine or tramadol for relief of pain after laparoscopic cholecystectomy.

**Material and Methods:** The patients were divided into 3 Groups of 50 each, Group A was given 50 ml 0.25% bupivacaine and 5 ml normal saline, Group B 50ml 0.25% bupivacaine plus tramadol 1mg/kg wt and Group C, 50ml 0.25% bupivacaine plus dexmedetomidine 1ug/kg. The duration of analgesic effect was noted based on the time difference between the disappearance of pain after the analgesic injection and reappearance of pain was recorded and assessed by using VAS scale.

**Results:** The number of females were slightly more than the male. The age group of the patients predominantly ranged between 31-40 years. Pain was significantly lower in Group C i.e. patients given bupivacaine plus dexmedetomidine compared to the patients in Group A and Group B. Patients in Group A i.e. with bupivacaine alone had the highest VAS score. Post-surgery, minor complications were seen in a few patients, with nausea being most common, followed by vomiting and pruritis.

**Conclusion:** Bupivacaine plus dexmedetomidine given to patients who underwent laparoscopic cholecystectomies was more effective as an analgesic compared to Bupivacaine alone or in combination with Tramadol

**Keywords:** Bupivacaine, Dexmedetomidine, Tramadol, Analgesics, Comparison

## Introduction

Cholecystectomy is the surgical removal of gallbladder due to certain indications like pancreatitis caused by gallstones, biliary colic, gall bladder cancer and other gall bladder conditions. Surgical removal may be done by open surgery or laparoscopic surgery.

Now a days, laparoscopic cholecystectomy is preferred to open cholecystectomy as there is lesser hemorrhage, better cosmetic results, lesser post-operative pain, shorter recovery time as well as lesser duration of hospital stay. The post-operative infection rate among the patients is also highly reduced.<sup>(1)</sup> Open surgery is normally performed only when there are contraindications for laparoscopic.<sup>(2)</sup>

Laparoscopic cholecystectomy, today, is considered a gold standard for treatment of cholelithiasis. When LC was first performed in the early 1990s, acute cholecystitis and cirrhosis were considered comparative contraindications.<sup>(3)</sup> However, surgeons growing expertise, allowed the use of LC in more complex procedures, such as in acute cholecystitis patients.<sup>(4)</sup>

Pain results from stretching of the intra-abdominal cavity,<sup>(5)</sup> peritoneal inflammation, and diaphragmatic irritation caused by residual carbon-dioxide in the peritoneal cavity.<sup>(6)</sup> Many methods have been proposed to relieve post-operative pain following laparoscopic cholecystectomy.<sup>(7)</sup>

Some authors suggest that intraperitoneal instillation of drugs for pain relief is effective if used before creation of pneumoperitoneum<sup>(8)</sup> while others conclude that intraperitoneal drug administration is effective at the end of the surgery applied through a

trocar<sup>(9)</sup> Pain is said to occur due to the peritoneal inflammation, diaphragmatic irritation which could cause by the residual carbon dioxide or the stretching of the intra-abdominal cavity. Instillation of local anaesthetics along with opioids or  $\alpha$ -2 agonists have been reported to reduce the post-operative pain.<sup>(10)</sup>

This study was conducted to evaluate the effect of intraperitoneal Bupivacaine alone or with dexmedetomidine or tramadol for relief of pain after laparoscopic cholecystectomy.

## Materials and Methods

This study was performed in the Department of Anesthesia at Mallareddy Institute of Medical sciences and Mallareddy Medical College for women over a period of two years and eight months. 150 patients belonging to the American Society of Anesthesiologists classification Grade I and II between the ages 18 – 60 years, undergoing laparoscopic surgeries were included in this comparative study. Patients allergic to local anesthetics, with acute cholecystitis, with cardiac, neurologic and other systemic diseases were excluded from the study. Those patients who converted to open cholecystectomy either by choice or due to other reasons were also excluded from the study.

Detailed history and demographic details were taken from all the patients. Preoperative examination were performed including routine investigations like urine analysis, blood urea, blood sugar, bleeding time, clotting time, ECG and X ray chest were performed for all the patients.

The nature of the study and procedure were explained to the patients and relatives in detail and

informed consent were taken from all the patients before their inclusion into the study. They were fasted for a minimum of 6 hours before the surgery and were not pre-medicated with analgesics and sedatives. Blood pressure, pulse rate and respiratory rate was recorded.

The patient was placed in horizontal position and an IV catheter of 18 – gauge was inserted and 6 ml/kg/h crystalloid was infused intraoperatively. ECG and non-invasive blood pressure was monitored continuously. Oxygen saturation was stated and the baseline was noted. General anesthesia was given with IV fentanyl, propofol and followed by succinyl choline for orotracheal intubation. Anaesthesia was maintained with 60% N<sub>2</sub>O in oxygen and 0.5-1% isoflurane. Muscle relaxation was done with vecuronium bromide.

The onset of analgesia was noted by loss of pain by pin prick method and inability to raise the lower limb, degree and level of sensory blockade and motor blockade, respiratory rate, duration of analgesia and post-operative analgesic effect were noted. Hemodynamic changes like pulse rate, blood pressure every 5 minutes interval for the first 30 minutes, there after every 15 minutes were recorded for the rest of the surgical procedure. Post operatively, they were recorded every 2 hours up to 12 hours and at 4 hourly intervals for 24 hours.

The patients were divided by using a random table into 3 Groups of 50 each. Group A was given 50 ml 0.25% bupivacaine and 5 ml normal saline, Group B 50ml 0.25% bupivacaine plus tramadol 1mg/kg wt and Group C, 50ml 0.25% bupivacaine plus dexmedetomidine 1ug/kg. Both Tramadol and dexmedetomidine were diluted in 5ml normal saline and all of them were administered intraperitoneally.

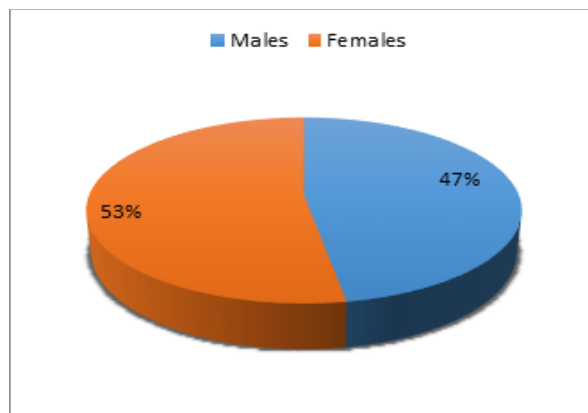
Side effects such as drowsiness, respiratory depression, itching, urinary retention, vomiting, headache and perspiration were also noted.

The duration of analgesic effect was noted based on the time difference between the disappearance of pain after the analgesic injection and reappearance of pain was recorded. Efficacy was assessed by using a visual analogue scale at 4 hourly intervals for 24 hours. Score '0' represents no pain and score 10 represents the maximum permissible pain. With any score of more than 6, the patients were administered supplementary analgesics and this was taken as the end point. Scores of 1,2,3 were considered as mild pain, 4,5,6 as moderate pain and 7,8,9, as severe pain.

1. How could you undergo surgery? You had not given GA? Intraperitoneal instillation will only provide relief in visceral pain.

## Results

Of the total 150 patients, 71 were males and 79 were females (Fig. 1).



**Fig. 1: Gender wise distribution of the patients**

Around 47% of the patients were in the age group of 31- 40 years. The age, weight and height of the patients were statistically insignificant in the study (Table 1).

**Table 1: General characteristics of the patients**

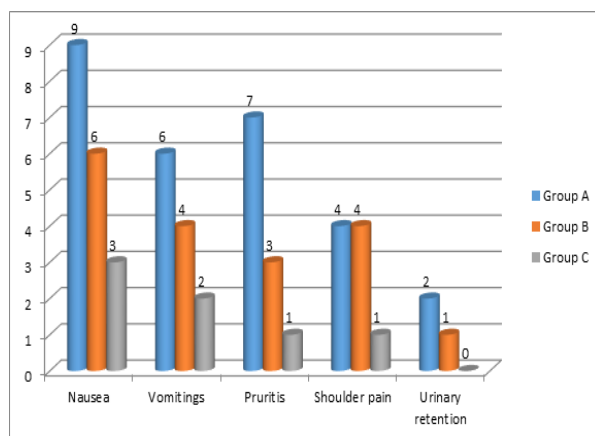
Variable	Group A	Group B	Group C
Mean Age (in years)	33.9 ±5.1	36.3 ±4.9	34.6 ±3.8
Sex			
Males	27	21	23
Females	23	29	27
Weight	57.3 ± 3.1	59.4 ± 4.1	61.5 ±5.8
ASA			
I	39	33	36
II	11	17	14
Duration of surgery	61.23 ± 7.1	60.41 ± 3.9	63.19 ± 6.1

The Vas score was taken regularly for the first 24 hours and the score reduced over time. It was also significantly lower among the Group C patients i.e. patients bupivacaine plus dexmedetomidine compared to the other two groups. Patients in Group A i.e. with bupivacaine alone had the highest VAS score (Table 2).

**Table 2: VAS score post operatively**

Time (in hours)	Group A	Group B	Group C
0.5	4.23 ±1.93	3.84 ±2.1	2.34 ± 1.1
1	4.92 ± 2.19	3.67 ±2.33	2.05 ± 0.89
2	5.34 ± 2.18	3.81 ± 3.2	1.93 ± 0.44
4	4.53 ± 3.17	2.18 ± 3.11	1.69 ± 1.0
6	4.69 ± 2.73	3.29 ±1.6	2.14 ± 0.81
12	4.8 ± 3.14	2.78 ± 2.14	1.46 ± 0.79
24	3.19 ± 1.63	2.11 ± 1.34	0.98 ± 0.35

Post-surgery, minor complications were seen in a few patients, with nausea being most common (18 patients – 12%). This was followed by vomiting and pruritis (Fig. 2).



**Fig. 2: Post surgery complications**

## Discussion

Laparoscopic cholecystectomy has shown to be superior to open cholecystectomy with reduced post-operative pain, morbidity and duration of convalescence.<sup>(2,11)</sup> Post-operative pain after laparoscopic cholecystectomy consists of three components, visceral, parietal and referred shoulder pain distinguishable from each other in the intensity, latency and duration.<sup>(6)</sup>

Many clinical trials were designed to determine the benefit of local anaesthetics and opioids, especially bupivacaine and morphine, which were administered intraperitoneally after laparoscopic cholecystectomy. Some investigators found that IP bupivacaine was effective in pain reduction, while others showed that it did not attenuate pain following laparoscopic surgery.<sup>(12-16)</sup>

Intraperitoneal injection of local anesthetic after gynecologic laparoscopy has proved to be effective. In this modern era of surgery, intraperitoneal instillation of local anaesthetic agents has become an important method to control post-operative pain, nausea, vomiting and reduced hospital stay.<sup>(17,18)</sup> In laparoscopic surgeries because of gas insufflations and raised intraperitoneal pressure, there is peritoneal inflammation and neuronal rupture with a linear relationship between abdominal compliance and resultant severity of post-operative pain.<sup>(19)</sup>

Intraperitoneal injection for pain relief after laparoscopic cholecystectomy has shown conflicting results as there are several factors that can influence the benefits of intraperitoneal analgesia. These factors are dose and concentration, site of instillation (sub-diaphragmatic versus sub-hepatic) and timing of instillation (before or after) of the anesthetic solution, volume of residual CO<sub>2</sub>, spillage of bile and blood, instillation in head-down position versus supine position and postoperative analgesia regimen.

Golubovic et al. in their study reported that the analgesic effects of the intraperitoneal injection of bupivacaine and/or tramadol in patients with laparoscopic cholecystectomy were both effective for

the treatment and management of pain after the surgery.<sup>(10)</sup> Therefore, there was less requirement of post-surgical analgesics. In our study also we found similar results with mild to moderate pain in the patients. However, in the patients with bupivacaine plus dexmedetomidine, the pain was significantly lower, with not even one patient experiencing more than mild pain and discomfort. Similar results were found in the study by Shukla et al.<sup>(21)</sup> and with Ahmed et al, both of whom have observed that bupivacaine plus dexmedetomidine was more effective as an analgesic for pain post-surgery than bupivacaine alone or with opioid like tramadol.<sup>(16)</sup>

We have observed in our study that the time required for the first request of analgesic by the patient post-surgery for management of pain was significantly lower in both groups A and B than on group C where it was longer. Similar was the case in the study by Shukla et al.<sup>(21)</sup> and by Ahmed et al.<sup>(16)</sup>

There was no statistical difference in the general demographics such as age or BMI or weight between the groups of patients.

There were few complications post-surgery among the three groups, out of which, group A had more complications than the others. Group C seemed to have the least number of complications. We have found this to be statistically significant, although in a similar study by Shukla et al, they found no statistical significant in the adverse effects between the patients injected intraperitoneally with similar medications.

As there are very few studies comparing three groups of medications for pain i.e. bupivacaine alone or with dexmedetomidine or tramadol, more studies need to be conducted to estimate the efficacy of these drugs.

## Conclusion

Bupivacaine in conjunction with dexmedetomidine administered to patients who underwent laparoscopic cholecystectomy was more effective as an analgesic as compared to Bupivacaine alone or Bupivacaine in combination with Tramadol. This was also, simple to use with minimal side effects and discomfort to the patient and hence can be routinely used.

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