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## Assessment of the post-surgical analgesic effect of local anesthetic drugs bupivacaine and lidocaine in patients of cholecystectomy

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### Abstract

**Background:** Removal of the gall bladder is one of the most common surgeries and is associated with many side effects. After the surgery, management of pain is the most important

**Objectives:** The present study was undertaken to assess and compare the post-surgical analgesic effect of local anesthetic drugs for patients of cholecystectomy.

**Methods:** The present study involved 30 patients who had undergone surgical removal of gall bladder and within the age group of 30 to 50 years of age. A visual analog scale was used to assess the pain levels in the patients. This is a standard scale to assess pain. Occurrence of adverse events like somnolence, nausea, and vomiting, and dizziness were observed among the two groups. Systolic and diastolic blood pressure and pulse rate were assessed using an automated blood pressure instrument manufactured by Omron.

**Results:** The study results suggest that both drugs are effective in the management of post-surgical pain. However, when compared, group 2 who received lidocaine showed better improvement as pain scores were significantly lower when compared with group 1. There is no significant difference in the systolic and diastolic blood pressures. But there is a significant difference in pulse rate. This correlated with the pain scores in the group 2 population.

**Conclusion:** The study results support the views of earlier studies to use the local anesthetic drugs for the management of pain after the surgery. The study recommends further studies in detail with more sample size and multiple centers to recommend this concept for the benefit of the general population.

**Keywords:** Cholecystectomy, analgesia, local anesthesia

### Introduction

Removal of the gall bladder is one of the most common surgeries and is associated with many side effects. After the surgery, management of pain is most important. Hence, pain management is a big task for physicians <sup>[1, 2]</sup>. The most common methods used by anesthetists prefer the usage of a combination of analgesia techniques, which includes drugs like paracetamol and local anesthetic drugs <sup>[3-5]</sup>. In current years, there is a growing interest in using local anesthesia for the management of pain after surgery. The common anesthetic drugs used in clinical practice are bupivacaine, chloroprocaine, lidocaine, procaine, and tetra Caine <sup>[6]</sup>. These local anesthetics act through inhibition of the sodium channels which are voltage-gated and located in the cell membrane <sup>[7]</sup>. Inhibition of the voltage channels causes prevention of the impulse transmission so that no more action potentials related to the pain will be transmitted to the cortex is prevented <sup>[8]</sup>. Recent studies explained using the combination of anesthesia drugs is more effective than using one drug <sup>[9]</sup>. This may be due to the synergistic effect of drugs. The present study was undertaken to assess and compare the post-surgical analgesic effect of local anesthetic drugs for patients of cholecystectomy.

### Materials and methods

**Study design:** Experimental study

**Sampling method:** Convenient sampling

**Study population:** The present study involved 30 patients who had undergone surgical removal of gall bladder and were within the age group of 30 to 50 years of age.

Both males and females were included in the study. Voluntary informed consent was obtained from all the patients before the study. Willing participants were included in the study. Patients with severe complications were excluded from the study. After the recruitment, patients were assigned to two groups randomly with fifteen patients in each group.

Group 1 (n=15): Administered bupivacaine for management of pain 150 mcg.mL<sup>-1</sup>

Group 2 (n=15): Administered lidocaine for management of pain 150 mcg.mL<sup>-1</sup>

**Assessment of pain:** Visual analog scale was used to assess the pain levels in the patients. This is a standard scale to assess pain [10].

**Assessment of autonomic functions:** Systolic and diastolic blood pressure and pulse rate was assessed using an automated blood pressure instrument manufactured by Omron.

**Occurrence of adverse events:** Occurrence of adverse events like somnolence, nausea, and vomiting, and dizziness was observed among two groups.

**Ethical consideration:** The study proposal was approved by an institutional human ethical committee. Informed consent was obtained from all the participants. Confidentiality of data was maintained.

**Data analysis:** Data was analyzed using SPSS 20.0 version. Student t-test was used to assess the significance of the difference between the groups.

**Results:** The two-tailed P value equals 0.5736 for systolic blood pressure. By conventional criteria, this difference is considered to be not statistically significant. The mean of Group One minus Group Two equals 4.00. 95% confidence interval of this difference: From -10.39 to 18.39. The two-tailed P value equals 0.0511 for diastolic blood pressure. By conventional criteria, this difference is considered to be not quite statistically significant. The mean of Group One minus Group Two equals 12.00. 95% confidence interval of this difference: From -0.06 to 24.06. The two-tailed P-value is less than 0.0001 for pulse rate. By conventional criteria, this difference is considered to be extremely statistically significant. The mean of Group One minus Group Two equals 26.00. 95% confidence interval of this difference: From 17.74 to 34.26. The two-tailed P value equals 0.0017 for the VAS score. By conventional criteria, this difference is considered to be very statistically significant. The mean of Group One minus Group Two equals 2.00. 95% confidence interval of this difference: From 0.82 to 3.18

**Table 1:** Adverse events in male and female patients

Parameter	Group 1 (n=15)	Group 2 (n=15)
Somnolence	3 (20)	2 (13.33)
Nausea and vomiting	1 (6.66)	1 (6.66)
Dizziness	2 (13.33)	1 (6.66)

Data was presented as frequency and percentage

**Table 2:** Autonomic parameters and VAS scores in male and female patients

Parameter	Group 1 (n=15)	Group 2 (n=15)	P value
Systolic BP	142±5.68	138±4.13	0.5736
Diastolic BP	96±3.61	84±4.65	0.0511
Pulse rate	114±3.10	88±2.58	<0.0001***
VAS score	6±0.52	4±0.26	0.0017*

Data were presented as mean and SEM. (\*P<0.05 is significant, \*\*\*P<0.001 is significant)

## Discussion

The present study was undertaken to assess and compare the post-surgical analgesic effect of local anesthetic drugs for patients of cholecystectomy. As the objective is to assess the analgesic effect, the study included the assessment of pain scores of the patients and also the autonomic parameters as there is a direct link between the pain score and sympathetic activity. Higher the pain score higher is the sympathetic activity and also there is an increase in the blood pressure and heart rate. The study results suggest that both drugs are effective in the management of post-surgical pain. However, when compared, group 2 who received lidocaine showed better improvement as pain scores were significantly lower when compared with group 1. There is no significant difference in the systolic and diastolic blood pressures. But there is a significant difference in pulse rate. This correlated with the pain scores in the group 2 population.

There is an increase in the importance of local anesthetic drugs for the management of pain after the surgery [11]. These drugs block the transmission through neurons about the sensation of pain. This is achieved by blocking the sodium channels located in the cell membrane [12]. This block results in hyperpolarization and inhibition [13]. Further, the studies highlighted the importance of dosage of the drug administration. It was well reported that the healing effect is very minimal when the dosage is 100 mcg.mL<sup>-1</sup> of both the drugs [14]. However, excess dosage is also not recommended as it was reported that using a dosage of 250 mcg.mL<sup>-1</sup> delays the wound healing. That is the reason the present study fixed the dosage as 150 mcg.mL<sup>-1</sup> [15, 16].

Further, the side effects observed are also less as only a few patients expressed the adverse events in the present study [17, 18]. Earlier studies reported that there is a toxic effect on muscles due to the usage of these drugs [19]. This may be due to long-term use as long-term blockage of the impulses is not recommended. The present study observed decreased pain scores and fast recovery using both drugs. However, there is little better effect by using lidocaine.

## Conclusion

The study results support the views of earlier studies to use the local anesthetic drugs for the management of pain after the surgery. The study recommends further studies in detail with more sample size and multiple centers to recommend this concept for the benefit of the general population.

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**Conflicts of interest:** None-declared

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