

## Comparison of intraperitoneal instillation of Bupivacaine plus Hydrocortisone v/s Bupivacaine plus Dexamethasone on post operative pain after Laparoscopic Cholecystectomy

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**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

### Abstract

**Background and aims:** Intraperitoneal instillation of steroids to alleviate postoperative pain after Laparoscopic Cholecystectomy is a lesser explored technique. Aim of study is to compare effectiveness of Bupivacaine with Hydrocortisone or Dexamethasone on duration of postoperative analgesia, along with first time to request analgesia.

**Method:** In this observational study, 24 patients of both sexes, 20-70 years of age, of ASA - I / II / III, undergoing elective Laparoscopic Cholecystectomy were randomized into 2 groups by concealed envelope method: Group BD to receive intraperitoneal instillation of 20 ml Bupivacaine (0.5%) with Dexamethasone 8 mg and Group BH to receive 20 ml Bupivacaine (0.5%) with 100 mg Hydrocortisone. The results were compared depending upon the first time of analgesic requirement, VAS scores, total analgesic consumption, and hemodynamic parameters.

**Results:** The rescue analgesia requirement time in Group BD was significantly greater than that of Group BH. The total analgesic consumption in Group BD was lower than that of Group BH. VAS scores, monitored for 24 hours, were lesser in Group BD compared to Group BH, post operatively. There were no significant differences in the hemodynamic parameters in both groups.

**Conclusion:** This observational study conducted in our institute indicated that Dexamethasone has a greater efficacy as an adjuvant to intraperitoneal Bupivacaine for post operative analgesia, in comparison to Hydrocortisone.

**Keywords:** Intraperitoneal instillation, Bupivacaine Hydrochloride (0.5%) Plain, Hydrocortisone, Dexamethasone, Visual Analogue Scale, Laparoscopic Cholecystectomy

### Introduction

The growing interest in minimally invasive surgeries has increased the number of patients undergoing laparo

scopic surgery. Although postoperative discomfort is usually transient and improves over time, immediate post-operative pain relief could decrease postoperative narcotic analgesic requirement, and its side effects - nausea and vomiting (PONV), delay in bowel function. This can facilitate early discharge and faster patient recovery resulting in greater patient satisfaction.

The postoperative pain after a laparoscopic surgery may be due to stretching of the intra-abdominal cavity, peritoneal inflammation and CO<sub>2</sub> induced diaphragmatic irritation, referring to the shoulder tip. For pain control after Laparoscopic Cholecystectomy, different methods have been described, like intraperitoneal instillation of drugs, intra incisional infiltration of local anesthetics, TAP block etc. Local anesthetics provide antinociceptive effects, by inhibiting the release and action of prostaglandin in that cause inflammation. Steroids act on the body through various mechanisms like suppression of Bradykinin, release of neuro peptides, peripheral suppression of phospholipids enzymes, thereby decreasing the cyclooxygenase and lipoxygenase pathways of inflammatory response and inhibition of other mediators of inflammation e.g. TNF, IL 6 and 12.

Thus by adding Hydrocortisone or Dexamethasone to Bupivacaine, the effect of postoperative analgesia will be enhanced. The intraperitoneal instillation provides a large surface area of absorption of anaesthetics, thus providing adequate analgesia.

In the study, we aim to demonstrate the effectiveness of pain control in patients after laparoscopic cholecystectomy using intraperitoneal Bupivacaine with Hydrocortisone or Dexamethasone.

### Materials and Method

The study was conducted among indoor patients admitted to our tertiary care hospital, after obtaining

written and informed consent from the institutional Ethical committee. The study design was Observational type. Inclusion Criteria included patients aged between 20-70 yrs, of ASA Grading I, II and III, undergoing Laparoscopic Cholecystectomy on elective basis.

Patients having a history of known allergy to local anesthetic agents, cases requiring conversion to laparotomy, patients with any infection at the site of anatomical landmarks, patients having altered coagulopathy, and patients who were unable to understand visual analogue scores were excluded from the study.

The patients were randomly divided into 2 groups as follows:

- GROUP BD: Bupivacaine (0.5%) 20ml + Dexamethasone 8mg (2ml) + 2ml of Normal Saline
- GROUP BH: Bupivacaine (0.5%) 20ml + Hydrocortisone 100mg (5ml)

### Sample size

Group BD - 12 cases & Group BH - 12 cases

Preoperative evaluation of patients was done before the surgery by taking history, general and systemic examination and necessary investigation and fitness for anesthesia was declared accordingly. Written informed consent was taken.

After noting the patient's NBM status and vitals, and securing an IV line, the patient was premedicated with Inj Glycopyrrolate 0.005-0.01 mg/kg iv Inj Ondansetron 0.1-0.2 mg/kg iv.

In Operation Theater, the baseline vitals were noted after attaching the monitor (SpO<sub>2</sub> probe, ECG, NIBP). Patients were preoxygenated with 100% O<sub>2</sub> for 3 min. Induction was done with Inj Fentanyl 1-2 mcg/kg iv, Inj Propofol 2-2.5 mg/kg and Inj Succinylcholine 1-1.5 mg/kg with IPPV. Oral intubation was done with an adequate size portex cuffed ET tube. Maintenance was

with 50% Nitrous oxide: 50% Oxygen with 0.5-1% iso flurane and muscle relaxant Inj Vecuronium 0.08-0.1 mg/kg initial dose and 0.01-0.015mg/kg maintenance dose. Minute ventilation was adjusted to keep the etCO<sub>2</sub> at 35-40 mmHg.

After completion of surgery, prior to extubation, scope was kept in situ and the study solution was given intra peritoneally before the removal of Trocar in Trendelenburg's position, in hepato diaphragmatic space, on gall-bladder bed and near and above the hepato duodenal ligament.

The residual neuromuscular block was reversed with Inj Neostigmine 0.05 mg/kg iv and Inj Glycopyrrolate 0.005 mg/kg iv, after the return of protective reflexes, after which extubation was done.

After completion of surgery, patients were shifted to PACU and the following parameters were monitored for 24 hours:

- VAS Scores

**Vitals - Pulse (bpm)**

- Mean Arterial Pressure (mmHg)
- Saturation (%)
- Respiratory Rate (/min)
- Total duration of analgesia
- Rescue analgesia requirement
- Inj Tramadol 1-1.5 mg/kg iv was provided as a rescue analgesic drug.
- VAS (VISUAL ANALOG SCALE) was used for postoperative pain assessment. Rescue analgesic was given after the patient pointed out a VAS score of  $\geq 3$ .

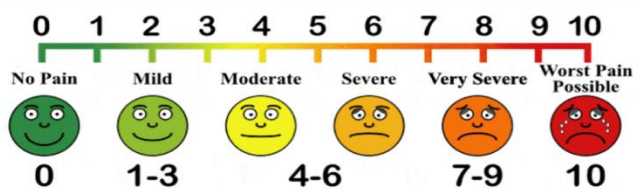


Figure 1:

**Observation**

The data collected after the observational study among 24 patients undergoing an elective Laparoscopic Cholecystectomy was subjected to a statistical analysis with Open EPI and SPSS software to come to a conclusion for the effectiveness of the compared groups. Inter group variations were analyzed with student t test and demographic data was analyzed by chi square test.

According to the study analysis, patients' age and duration of surgery were found not statistically significant between both the groups.

	GROUP	MEAN	SD	p VALUE
AGE	BD	42.75	10.47	0.622
	BH	40.41	12.43	
DURATION OF SURGERY	BD	122.54	9.79	0.142
	BH	116.32	10.27	

Table 1

Also, 10 out of 12 patients were females in the group BD, whereas 11 out of 12 patients were females in group BH.

	M	F
BD	16.66%	83.30%
BH	8.33%	91.66%

Table 2

The VAS Scores compared between the two groups showed no statistical significance at 0.5, 1-, and 2-hours post-op.

They were significant at 4-, 6-, 12-, and 24-hours post-surgery, with the VAS Scores being significantly lower in Group BD compared to Group BH.

	TIME (HOURS)	GROUP BD	GROUP BH	P VALUE
VAS SCORES	0.5	0.57 ± 0.51	0.83 ± 0.71	0.323
	1	0.75 ± 0.75	1.08 ± 0.66	0.264
	2	0.91 ± 0.66	1.33 ± 0.77	0.173
	4	2.08 ± 0.51	3.25 ± 0.62	0.00058*
	6	3.16 ± 0.57	4.08 ± 0.79	0.003*
	12	4.16 ± 0.05	5.33 ± 1.15	0.004*
	24	6 ± 1.20	7.41 ± 0.90	0.003*

Table 3

The difference in Heart rate and Mean arterial pressure in subjects of both the groups were not statistically significant within 24 hours post-op.

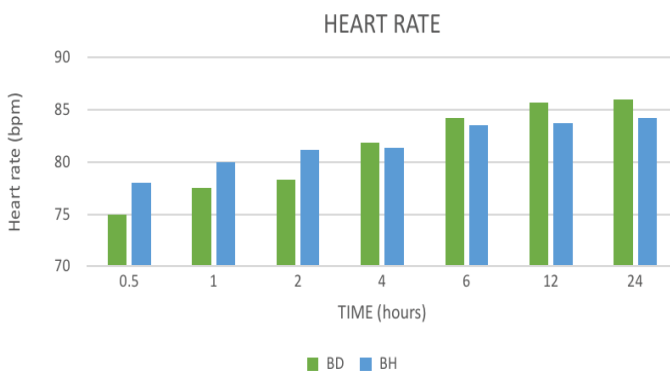


Figure 1

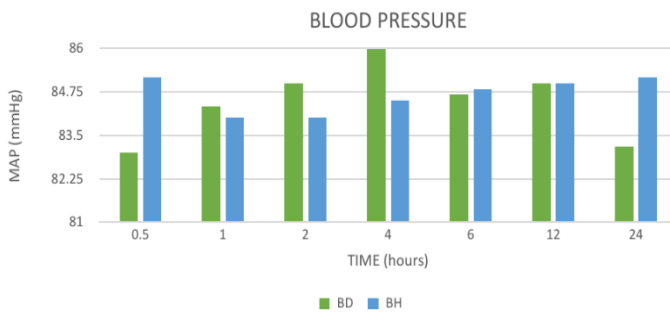


Figure 2

The rescue analgesic (Tramadol) requirement in Group BD was at 5.2 ± 1.13 hours compared to 3.79 ± 1.05 hours in Group BH.

Total Tramadol consumption in Group BD was 4 ± 0.73 mg/kg, compared to 4.83 ± 1.09 mg/kg in Group BH. Both these parameters were statistically significant.

	Group BD	Group BH	P Value
Rescue Analgesia Time (Hrs)	5.2 ± 1.13	3.79 ± 1.05	0.004*
Total Analgesia Requirement (mg/kg)	4 ± 0.73	4.83 ± 1.09	0.039*

Table 4

### Discussion

Pain is a personal and subjective experience with considerable interpatient variability in their capacity to perceive pain. Surgery produces local tissue damage with consequent release of algetic substances, which stimulate and sensitize the nociceptors.

Various methods for laparoscopic post-op pain relief have been studied, like intra peritoneal instillation of drugs in sub diaphragmatic space, intra incisional infiltration of local anesthetics, TAP block etc. Intra peritoneal Bupivacaine has a half-life of 1.5-5.5 hours and reaches its peak serum level at 20-30 minutes.

Addition of glucocorticoids to this causes a prolongation in its analgesic effect. The mechanism of action of steroids includes the suppression of bradykinin and release of neuro peptides from nerve endings, which inhibit cyclooxygenase pathway and reduce the Prostaglandin production. The inhibition of mediators of inflammation also occurs causing inhibition of hyperalgesia.

**Mahesh Sharma<sup>1</sup>** compared the effects of Bupivacaine alone vs Bupivacaine with Hydrocortisone for pain relief after Laparoscopic Cholecystectomy. They observed significantly lower VAS scores with Bupivacaine plus Hydrocortisone group at 0, 2, 4, 6, 12, and 24 hours, as compared to patients who received Bupivacaine alone.

The study of Sabzi Sarvestani (2014)<sup>2</sup> which compared the intraperitoneal instillations of Bupivacaine vs Hydrocortisone, showed that post-op VAS score at 0hrs,

6hr, 12hrs, and 24hrs were statistically not significant in both the groups.

Zahra Asgari (2011)<sup>3</sup> used intraperitoneal Dexamethasone in laparoscopic Gynecological surgeries, and concluded that the pain severity after 2 hrs post op was lesser in Dexamethasone group compared to placebo. The average amount of analgesic consumption was also decreased in the Dexamethasone group compared to placebo (p=0.025). This corroborates with our study in terms of Dexamethasone being an efficient analgesic.

A study was conducted by Ashvin Kanko Tiya and Digant Patel<sup>4</sup> in 2016. They compared the efficacy of intra peritoneal Bupivacaine plus hydrocortisone vs Bupivacaine alone for pain relief after laparoscopic cholecystectomy. They observed that VAS scores at 6, 12 and 24 hours were significantly lower in patients who received Bupivacaine with hydrocortisone as compared to patients who received Bupivacaine alone, whereas VAS scores at 0 hour were similar in both the groups. The result was in accordance with our study.

Khaled M Gaballah et al<sup>5</sup> compared the pain relief after laparoscopic cholecystectomy, after intraperitoneal instillation of Bupivacaine, Hydrocortisone and Magnesium sulphate in different combinations. They observed that combination of Bupivacaine with Magnesium sulphate provided the best analgesia followed by Bupivacaine plus Hydrocortisone. The first call for rescue analgesia in Bupivacaine plus Hydrocortisone group was at 3.4 ± 0.3 hours, which was comparable to our study, where rescue analgesia in Group BH was given at 3.79 ± 1.05 hours.

Alsheefa Zahra (2021)<sup>6</sup> compared the effects of Bupivacaine, either plain or with MgSO<sub>4</sub> or Dexamethasone, and the results showed VAS score to be significant at 4, 6, 12, 24 hrs. post-op. Also, the first call for analgesia in

the Dexamethasone group was at 4.8 ± 1 hr, which supported the results of our study where the mean time for rescue analgesia was at 5.2 ± 1.13 hr.

### Conclusion

The comparative study of intra peritoneal instillation of Bupivacaine with Dexamethasone vs Bupivacaine with Hydrocortisone showed that Group BD has a lesser VAS score, lesser analgesic requirement, and longer duration for first call of analgesia (rescue analgesia), in comparison to Group BH. The hemodynamic parameters show no significant differences postoperatively. Hence, we conclude that Dexamethasone is a better adjuvant than Hydrocortisone for reducing post operative pain after a Laparoscopic Cholecystectomy.

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