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### RESEARCH ARTICLE

#### INTRAPERITONEAL BUPIVACAINE FOR POSTOPERATIVE PAIN RELIEF AFTER LAPAROSCOPIC CHOLECYSTECTOMY

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#### Abstract

Pain is defined as “an un-pleasant sensory and emotional experience associated with actual or potential tissue damage”. Laparoscopic cholecystectomy is now an established form of treatment for patients with symptomatic gallstones. Recent studies have shown that patients may experience considerable pain after laparoscopic cholecystectomy. The various methods used with variable success are NSAID'S, infiltration of wound with local anesthetics and intermittent intramuscular narcotics. In Laproscopic Cholecystectomy after removal of gall bladder from the abdominal cavity using an endobag the position of the patient was made supine and 0.25% of 10 ml bupivacaine was instilled in the gall bladder fossa under direct laparoscopic control in Group A patients while Group B patients did not receive any such solution. Group A showed less intensity of pain with time duration as compared to Group B. A descriptive analysis of the VAS pain scores was in table 1. Statistically significant stepwise decrease in pain score at 4 hrs, 8 hrs, 12 hrs and 24 hrs were found in Group A and B. Intraperitoneal bupivacaine for laparoscopic cholecystectomy in a dose of 10 ml of 0.25% rather than using a higher dose reduces pain in the initial postoperative period and also in first 24 hrs, it is easy to administer with no adverse effects and may become a routine practice for this procedure.

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#### Introduction:-

Pain is defined as “an un-pleasant sensory and emotional experience associated with actual or potential tissue damage”.<sup>1</sup> From this definition it is clear that pain is a multi-modal entity and is the end result of diverse input conditioned by the individual's constitution and prior experience.<sup>2</sup> Postoperative pain remains one of the most prevalent problems in healthcare today and pain control is a topic of current interest.<sup>3</sup>

Laparoscopic cholecystectomy is now an established form of treatment for patients with symptomatic gallstones. Although thought to result in less postoperative pain, recent studies have shown that patients may experience considerable pain after laparoscopic cholecystectomy.<sup>4, 5</sup> The various methods used with variable success are NSAID'S<sup>6</sup>, infiltration of wound with local anesthetics<sup>7</sup> and intermittent intramuscular narcotics<sup>8</sup>. Narchi et al observed reduction in postoperative shoulder pain in minor gynecological surgery after intraperitoneal instillation of local anesthetics<sup>9</sup>. With the possibility that a similar beneficial effect might be achieved in laparoscopic cholecystectomy a number of studies were carried out with variable results<sup>4, 5, 10, 11</sup>. Keeping in view the variable results obtained by Bupivacaine is used to control postoperative pain after laparoscopic procedures. In many studies

0.125 % to 0.5% bupivacaine is used intraperitoneally<sup>12</sup> or in the wound<sup>13</sup> but with conflicting result. While in others, the use of intraperitoneal bupivacaine is found safe and effective. This technique for relieving postoperative pain is easy to perform in patients undergoing laparoscopic cholecystectomy.<sup>14-20</sup>

This study was conducted to see the efficacy of instillation of 10 ml 0.25% bupivacaine intraperitoneally after removal of gall bladder in gall bladder fossa for post-operative pain relief after laparoscopic cholecystectomy and then to apply the same for the future laparoscopic cholecystectomies.

### Material & Methods:-

The study was conducted in Department of General surgery, in a multispeciality hospital at Lucknow from August 2013 till June 2014. Sampling technique is non-probability purposive. After the approval of local ethical committee a study was done on 120 patients undergoing Laparoscopic Cholecystectomy. Written and informed consent was taken from all the patients. The method of using Visual Analogue Scale was explained to the patients pre operatively. Same surgical team performed all the surgical procedures. Laparoscopic cholecystectomy was completed with the standard four-port technique and carbon dioxide pneumoperitoneum. Patients with mucocele, empyema and patients in whom drain was placed, were excluded from the study. After removal of gall bladder from the abdominal cavity using an endobag the position of the patient was made supine and 0.25% of 10 ml bupivacaine was instilled in the gall bladder fossa under direct laparoscopic control in Group A patients while Group B patients did not receive any such solution.

Simultaneously, each group was assessed for intensity of pain at rest through Visual Analogue Scale at 4, 8, 12 and 24 hrs after surgery. All the patients were discharged 24 hours post operatively. The consumption of analgesics was also recorded. All the assessments were performed by a single observer (post graduate on duty) who was blinded to the group allocations. Data regarding mean pain score was collected through structured proforma. Data was analyzed at SPSS version 15.0. Baseline data (intensity of pain) was first analyzed through VAS after 4 hrs after surgery. The intermediate readings were at 8 and 12 hrs and final assessment at 24 hrs after surgery. Paired t test were applied to assess the data. The results were concluded significant when p-value less than 0.05 ( $p < 0.05$ ).

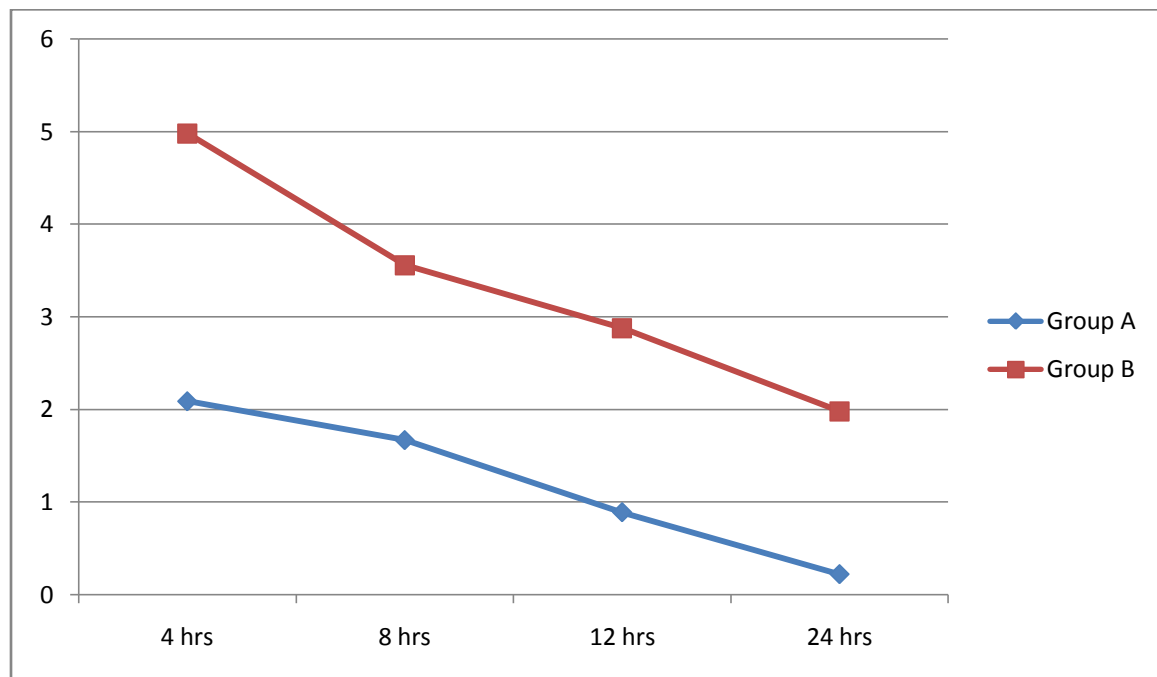
### Results:-

A total of 120 patients planned for elective cholecystectomy were included in this study divided in two groups. All were adult males and females. The gender distribution between two groups showed non-significant difference (Fishers Exact Test=0.325 with  $P=0.16$ ). Overall male to female ratio was 1:3.7. Mean age (years) of Group A was  $45.04 \pm 13.85$  ranging from 25 to 70 years while in Group B it was  $44.86 \pm 15.07$  ranging from 20 to 65 years. The difference in age between two groups was found statistically insignificant ( $t=0.068$ ,  $P=0.95$ ). Weight (kgs) between two groups was found statically insignificant ( $t=0.24$ ,  $P=0.81$ ). In Group A mean weight was  $57.87 \pm 8.65$  kgs and in Group B it was  $58.23 \pm 7.56$  kgs. ASA Status I was more frequent in both groups as compared to Status II. Status I were 59.2% whereas Status II were 40.8% in Group A. In Group B, ASA Status I were 69.4% and Status II was 30.6%. There is no statistical difference in frequency distribution of two groups in ASA status (Fishers Exact Test=0.40,  $P=0.25$ ).

Group A showed less intensity of pain with time duration as compared to Group B. A descriptive analysis of the VAS pain scores was in table 1. Statistically significant stepwise decrease in pain score at 4 hrs, 8 hrs, 12 hrs and 24 hrs were found in Group A and B as shown in figure & table below.

Variables	Group	N	Mean	SD	t-value	p-value
Age	Group - A	60	45.04	13.85	$t = 0.068$	0.95*
	Group - B	60	44.86	15.07		
Weight (kg)	Group - A	60	57.87	8.65	$t = 0.24$	0.81*
	Group - B	60	58.23	7.56		
VAS at 4 hrs	Group - A	60	2.09	0.87	$t = 17.0825$	< 0.0001 <sup>#</sup>
	Group - B	60	4.98	0.98		
VAS at 8 hrs	Group - A	60	1.67	0.57	$t = 13.8519$	< 0.0001 <sup>#</sup>
	Group - B	60	3.56	0.89		
VAS at 12hrs	Group - A	60	0.89	0.34	$t = 20.0391$	< 0.0001 <sup>#</sup>
	Group - B	60	2.88	0.69		
VAS at 24hrs	Group - A	60	0.22	0.48	$t = 13.14$	< 0.0001 <sup>#</sup>
	Group - B	60	1.98	0.92		

\*Statistically insignificant #statistically significant



**Figure:** -A statistically significant difference was seen in VAS after 4,8,12 and 24 hrs of laparoscopic cholecystectomy.

### Discussion:-

Although minimally invasive surgery characterized by reduced pain, it is not painless. Patients undergoing laparoscopic cholecystectomy suffered considerable pain on the day of surgery frequently requiring narcotic analgesics. Local infiltration of analgesia had been used successfully in combination with General anesthesia for breast surgery, facial cosmetic operations and body contouring procedures.

In the early post operative period visceral pain accounts for the most of the pain experienced after laparoscopic cholecystectomy.<sup>5</sup> Local anesthetics induced anti nociception by acting on the nerve membranes. These analgesics interventions need to produce a sufficiently dense and long duration of blockade for them to block the transmission of noxious afferent information from the periphery to the spinal cord and brain.<sup>6</sup>

There is little evidence with regard to which type of LA is most effective because limited data are available for drugs other than bupivacaine. Bupivacaine itself (or levobupivacaine) is an excellent choice for intraperitoneal LA because of its long duration of action.<sup>7</sup> The originality of this trial was the instillation of 0.25% of 10 ml bupivacaine intraperitoneally only after the removal of gall bladder in the gallbladder fossa. At trocar site or incisional site no local anesthetics was instilled, as many studies did not support port site local anesthetic infiltration of wound.<sup>21, 22</sup> Clinical studies of intraperitoneal bupivacaine had inconsistent results. Few authors have found a statistically significant difference with the use of local anesthetics<sup>10, 20, 23–25</sup> others could not repeat these results.<sup>26, 27</sup> Furthermore in a few studies that have found a statistically significant difference with the use of bupivacaine, the difference between the average pain scores was less than 1 in a scale of 10.<sup>23, 25</sup>

Narchi et al found intraperitoneal local anesthetics to be more effective in reducing pain up to 48 hrs postoperatively in patients undergoing diagnostic laparoscopy<sup>9</sup>. Subsequent studies failed to demonstrate the beneficial effect of intraperitoneal instillation of local anesthetics in patients undergoing laparoscopic cholecystectomy<sup>4, 5, 10, 12</sup>.

Utilizing 20 ml of either 0.25% bupivacaine or 0.5% lignocaine, Rademaker et al failed to demonstrate any reduction in postoperative pain.<sup>4</sup> A possible explanation of the failed effect given by them was the small amount of

local anesthetics used as compared to Narchi et al. Also instillation of local anesthetics in the supine position prevented its flow over the coeliac plexus and phrenic nerve endings.

Joriset et al. studied the characteristics of pain after laparoscopic cholecystectomy and the effect of intraperitoneal instillation of 80 ml of 0.125% bupivacaine with adrenaline<sup>5</sup>. They found that visceral pain accounts for the major discomfort experienced in early postoperative period whereas shoulder tip pain becomes the main complaint on the second day. The intensity of shoulder pain in their study was less than the study of Narchi et al. probably because of careful emptying of carbon dioxide pneumoperitoneum. The author felt that because of existence of several components of pain, its relief will depend on therapy for each of these components. In addition an anatomic intraperitoneal flow directs local anesthetics away from cholecystectomy wound and therefore cannot attain sufficient concentration to block the nociceptive input from abdominal wall incisions. Keeping in view the importance of positioning while instilling the local anesthetic, Scheinin et al. administered 100 ml of either 0.15% plain bupivacaine or with adrenaline in 20 degree head down tilt maintained for 20 min.<sup>11</sup> They found no relief of pain after laparoscopic cholecystectomy. The lack of analgesic efficacy can be attributed to the lower concentration of bupivacaine used and more extensive and longer duration of surgery compared to gynecological laparoscopies.

Studies done previously used 20 ml of 0.5 % Bupivacaine had also shown similar results as ours.<sup>28,29</sup> In our study a statistically significantly low VAS was seen in Group A using 0.25% of 10 ml Bupivacaine as compared to Group B using no intraperitoneal anesthetic agent instillation.

### Conclusion:-

Intraperitoneal bupivacaine for laparoscopic cholecystectomy in a dose of 10 ml of 0.25% rather than using a higher dose reduces pain in the initial postoperative period and also in first 24 hrs, it is easy to administer with no adverse effects and may become a routine practice for this procedure.

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