Effectiveness of Spraying 0.5% Levobupivacaine Under the Surface of Diaphragm and Gallbladder Fossa after Laparoscopic Cholecystectomy

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ABSTRACT

Introduction: Since the first Laparoscopic cholecystectomy was done in 1985, there are substantial and gradual advances in the different measures for postoperative pain management. But still, after this procedure, the patient complains of pain in the upper abdomen, pain over the shoulder tip and also pain due to incision.

Methods: Current study was done to determine whether spraying 0.5% Levobupivacaine under the surface of diaphragm and gallbladder bladder fossa have any positive result in pain management after surgery. The current study was conducted on a total of 50 patients out of which half (group I) were administered Levobupivacaine and in the remaining half (group II), Levobupivacaine was not used.

Results: Numeric Rating Scale of pain at 1, 6, 12 and 24 hours after surgery showed remarkable improvement in NRS scores in group I as compared to group II.

Conclusions: Postoperative pain was reduced and the analgesic requirement was delayed up to 12 to 14 hrs in the test group, whereas in the control group analgesia was required within 6 to 8 hrs.

Key Words: Levobupivacaine, Laparoscopic cholecystectomy, Gallbladder fossa

INTRODUCTION

There is a huge difference between the kind of pain experienced after open cholecystectomy and laparoscopic cholecystectomy. In laparoscopic type, the major cause of post-operative pain is of visceral origin. Parietal pain is of not much significance due to smaller incisions¹. Also, it is a well-known fact that laparoscopic surgery is preferred by the patient due to lesser pain experienced after surgery. Hence active efforts must be done to minimize this post-operative pain. Now post-operative pain after this procedure entails three components with varying mechanisms, intensity and duration of action.

They are the incisional type of parietal origin, deep intra-abdominal type of visceral origin and pain over the tip of the shoulder which is a type of referred pain. Now after laparoscopic cholecystectomy is done, this visceral type of pain is encountered earlier with declining intensity post 24 hours. Cough aggravates such pain but it remains unchanged after mobilization. Contrary to that, pain in the

shoulder remains milder in earlier phase but it gradually rises on 2nd post-operative day^{2,3}. This radiating pain in the shoulder is secondary due to irritation of diaphragm which is due to carbon monoxide insufflations for the creation of pneumoperitoneum. Many etiologies for this pain causation have been suggested like abdominal wall trauma, rapid abdominal distension, gallbladder trauma, traumatic nerve traction, raised abdominal pressure, phrenic irritation and cold CO₂ application^{4,5}.

Inappropriate management of this pain gives rise to many reflex phenomena like oliguria, embolism, thrombophlebitis, distension and indigestion due to gut immobility. Delayed muscular movements may lead to wasting of muscle and lethargy leading to a long period of recovery⁶. As this post-operative pain is of multiple origins, the common agreement has not been concluded regarding its effectual remedy which will be applicable for all subjects with minimal aftereffects like gastritis, nausea, paralytic ileus and many cardiovascular ailments. Many techniques like oral opioids, intravenous corticosteroids, non-steroidal anti-inflammatory drugs, con-

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trolled intravenous anaesthesia have been tried with their respective systemic side-effect.

Any method for pain alleviation should have two basic components: maximum local action and minimal systemic side-effect. An extremely simple procedure of intraperitoneal spraying of 0.5% Levobupivacaine under the surface of diaphragm and gallbladder fossa is effective and don't require any special instrument. Levobupivacaine blocks the formation and transmission of nerve impulses by raising the threshold for electrical excitation in the nerve, by decelerating the transmission of nerve impulse, and by decreasing the rate of action potential increase. Anaesthesia development is approximately related to the thickness, myelination, and velocity of the nerve fibres affected. In particular, the drug binds to the intracellular portion of the sodium channels and prevents sodium inflow into the nerve cells, preventing depolarization^{7,8}.

As compared to other local anaesthetics, the longevity of action of Levobupivacaine is higher. The average duration of action of Levobupivacaine hydrochloride is up to 9 hours which is 2-3 times higher than lignocaine^{9,10}. Tucker et al. observed that Levobupivacaine is 90% protein-bound in plasma hence is a safe drug as the active component is the unbound form.¹¹ The only major side effect is of cardiac toxicity which can be taken care of and its use should be avoided intravascularly/ on pregnant women and in severely debilitated patients. Scott et al.¹² and Pratibha Deshmukh et al.¹³ found that when such drugs are administered intravenously, some of the other forms of central nervous toxicity is evident in the forms ranging from tinnitus, ocular disturbances, muscular twitching to convulsions, apnoea or unconsciousness.

AIMS AND OBJECTIVES:

To study the effectiveness of spraying 0.5% Levobupivacaine under the surface of diaphragm and gallbladder fossa after laparoscopic cholecystectomy.

METHODS

This study was conducted on 50 patients who gave written consent for undergoing laparoscopic cholecystectomy.

Exclusion criteria: Any history of allergy to Levobupivacaine or after sensitivity test, history of coronary heart disease which required medical attention or any history of long-lasting pain related to gallbladder ailment or pregnancy.

Inclusion criteria: Patients with diseases of gallbladder who underwent standard 4 port laparoscopic cholecystectomy with a 10 mm epigastric and umbilical port and two 5 mm working ports. A standard 10 mm supraumbilical inci-

sion was given after inducing anaesthesia with endotracheal intubation and patient in 30 degrees Trendelenburg position. A Veress needle was used to create pneumoperitoneum with CO2 insufflator to create an intra-abdominal pressure pneumoperitoneum of 10 mmHg at a flow rate of 1 litre/min.

The patients were categorised into two groups of twenty-five cases each. In group A patients, 0.5% Levobupivacaine was sprayed under the surface of diaphragm and gallbladder fossa. Out of 10ml of 0.5% Levobupivacaine, 7.5ml was sprayed over each hemidiaphragm and 5ml at gallbladder fossa. In patients of group B, Levobupivacaine was not used. The severity of Pain was calculated at 1,6,12 and 24 hours after surgery. Post-surgical pain was assessed using 10 points NRS (numerical rating scale). Grade 0- corresponded to no pain and grade 10 was given to the worst pain the patient had ever experienced.

RESULTS

Table 1: Showing comparison of study subjects with and without administration of 0.5% Levobupivacaine

Post-surgery duration (hours)	Pain in Group A patients		Pain in Group B patients	
	Mild	Moderate to severe	Mild	Moderate to severe
1	25 (100%)	0 (0%)	2 (6.66%)	23 (76.66%)
6	22 (88%)	3 (1.2%)	4 (13.33%)	21 (84%)
12	18 (72%)	7 (28%)	3 (12%)	22 (88%)
24	16 (64%)	9 (36%)	8 (26.66%)	17 (68%)

Table no 1 showing at one hour, 100% patients in group A experienced mild post-operative pain but in group B, around 77 % cases experienced moderate to severe pain. At six hours, 88% of cases in group A experienced mild post-operative pain but in group B, around 84% of cases experienced moderate to severe pain. At twelve hours, 72 % patients in group A experienced mild post-operative pain and 7 cases suffered from moderate to severe pain. In group B, around 88 % of cases experienced moderate to severe pain postoperatively after 12 hours. At twenty-four hours, 64 % patients in group A experienced mild post-operative pain and 36 % cases suffered from moderate to severe pain. In group B, around 68 % cases experienced moderate to severe pain and required medications for that.

DISCUSSION

Laparoscopic cholecystectomy is one of the most frequent elective laparoscopic surgical interventions performed. In such surgeries we noticed that the patients frequently complain of postoperative pain and often, those patients complain

of abdominal pain and pain at the tip of the shoulder. The current research was done to examine, whether spraying 0.5% Levobupivacaine under the surface of diaphragm and gallbladder fossa after laparoscopic cholecystectomy is effective in relieving the postoperative pain suffered by the patient in the early post-surgical period.

The periportal local anaesthesia reduced the need of post-surgical analgesic drug.¹³⁻¹⁵ Alexander et al. were also in agreement with the same. We also noticed that the trocar site infiltration of Levobupivacaine is very efficacious. In the present study, spraying 0.5% Levobupivacaine under the surface of diaphragm and gallbladder fossa after laparoscopic cholecystectomy was extremely effective. The same size in our study was limited, so that may need further exploration. Bisgaard et. al. and Lee et al.¹⁶ found that combination of anaesthesia, both local and intraperitoneal is effective in decreasing incisional pain but not in visceral or shoulder pain. A study conducted by Scheinin et al. showed that even when bupivacaine was used in combination with adrenaline intraperitoneally, no cardiac or central nervous side effects were experienced by the patients¹⁷. Weber et al. also concluded the same results¹⁷.

CONCLUSION

When 0.5 % Levobupivacaine is sprayed under the surface of diaphragm and gallbladder fossa after laparoscopic cholecystectomy, there is a great improvement in the management of post-operative pain. Postoperative pain was reduced and the analgesic requirement was delayed up to 12-14 hours in the test group as compared to a control group where analgesia was required within 6 to 8 hours. Also, there are no complications encountered when used in combination with adrenaline. Along with that, there are no significant cardiovascular and central nervous systemic side effects.

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