

# Two versus Three Ports Technique for Laparoscopic Cholecystectomy: A Randomized Comparative Study

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## Abstract

**Introduction:** Laparoscopic cholecystectomy (LC) using 3 or 4 surgical ports has been previously compared in various clinical trials. However, LC using 3 or 2 surgical ports has not been evaluated.

**Materials and Methods:** Patients were randomized into two groups: L2 using 2 ports for LC and L3 using 3 standard ports for LC.

**Results:** Pain was evaluated at recovery, 4<sup>th</sup> h and then every 24 hourly up to the 5<sup>th</sup> post-operative day, using a visual analog pain scale. Patients in Group L2 and L3 had similar post-operative pain scores and analgesic consumption.

**Conclusion:** In terms of post-operative pain score and analgesic consumption, 2 post-LC does not offer any added benefit over 3 ports LC.

**Key words:** Pain in laparoscopic cholecystectomy, 3 ports laparoscopic cholecystectomy, 2 ports laparoscopic cholecystectomy

## INTRODUCTION

Laparoscopic cholecystectomy (LC) emerged as a new modality in 1989 for the treatment of symptomatic biliary lithiasis and very soon after it became the new gold standard for the treatment.<sup>1-3</sup> The benefits of LC include lower post-operative pain, shortened hospital stay, early recovery, and better cosmetic results. Although initially the technique was started as a surgical procedure with 4 ports but with time various modifications were made to make it less invasive. Initially, a 3 ports laparoscopic approach was preferred based on proper anatomical visualization of the operative site at the time of the initial laparoscopic evaluation. The introduction of the working channel laparoscope had further made it possible to use only 2 ports, along with

transdermal sutures and needles, for cholecystectomy. To our knowledge, there are no studies that have compared between 3- and 2-port approaches for LC; therefore, to elucidate which of these two approaches is better we aimed to compare the post-operative analgesic consumption and pain perception in these 2 groups of patient: LC performed with 3 and 2 ports.

## MATERIALS AND METHODS

After Institutional Ethical Clearance and Departmental permission this prospective randomized, observational study was done concurrently in the various medical colleges of Assam, among the patients presenting for LC by a total of five surgeons from January 2013 till September 2015. Inclusion criteria were as follows: Consecutive patients who were scheduled for elective LC due to gallstones, with American Society of Anesthesiology Grade I or II classification. Patients having severe systemic disease were excluded from the study group. Patients were familiarized with the study procedure and consent was obtained from all patients. A total of 70 patients were enrolled into this study who presented for elective LC. Eight patients

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were excluded due to demand for open surgery, not consenting for the study and due to associated severe systemic disease. A total of 62 patients were observed after exclusion. Informed consent was obtained from all patients included in our study. Patients were then assigned into the Group L2 or the Group L3 based on computer generated random numbers. Group L2 contain 30 patients and Group L3 contained 32 patients, respectively. The patient's age, weight, and other relevant demographic data were recorded. In Group L2 patients, LC was performed using 2 surgical ports where as in Group L3 patients it was performed using 3 surgical ports. Patients requiring conversion to open surgery were eliminated from our study. The same general anesthesia protocol was used in all patients. At the beginning of the surgery, all port sites were infiltrated with 0.25% bupivacaine 5 ml per port site. All patients were managed on an ambulatory basis when possible. When 10-12 mm ports were used, the fascia was routinely closed with polyglactin, and skin ports with polypropylene. In all of our study patients a standard high-definition laparoscopic module was used (Karl Storz, Tuttlingen, Germany), a urinary catheter was inserted for the duration of surgery, no routine gastric cannulation was done and pneumoperitoneum was created with the Veress needle, keeping intra-abdominal pressure below 12 mmHg in all our study patients. Patients were placed in a reverse Trendelenburg position, with slight rotation to their left side. In L3 group: One 10 mm umbilical port, one 10 mm subxiphoid port, and a 5 mm port in the right subcostal area of the midclavicular line were installed, the standard rigid 10 mm 08 optics and standard straight instruments were used, the gallbladder was pulled to expose Calot's triangle and the dissection made to obtain a critical view,<sup>4</sup> the cyst duct and the artery were ligated with titanium clips and the gallbladder dissection of the hepatic bed was performed with an electro-surgical hook. In L2 group: One umbilical 12 mm port and a 10 mm port in the right flank midaxillary line were installed, a rigid 12 mm 30 degree laparoscope with a working channel was introduced through the umbilical port, the right flank port was used with the auxiliary standard instruments to pull and fix the gallbladder, the clip applicator was used to ligate the cyst duct and the artery dissection was made with instruments introduced through the working channel and a 65 cm Maryland dissector, and hook and scissors were used. In this technique, the patient was placed in lithotomy position, with the surgeon standing between the legs. The gallbladder was extracted via the umbilical port.

Postoperatively all patients were observed in the recovery room where pain was assessed using a standard visual analog pain scale (VAS) (on a scale of 0-10), pain scores were recorded at recovery, then at 4<sup>th</sup> h and thereafter at every 24 hourly, till the 5<sup>th</sup> post-operative day by an observer

who was blinded to the study group. Rescue analgesic in the form of injection tramadol 50 mg intravenous was administered on demand and repeated every 8 hourly thereafter if necessary, total analgesic requirement for the first 48 h postoperatively was also recorded.

In all cases, the intraoperative goal was to obtain the critical view of the Calot's triangle<sup>4,5</sup> before any clip was applied or any cut was made. No drains were placed in any of our patients. Patients were discharged as per hospital protocol and asked to come for review at the outpatient department after 7 days or immediately if they had any wound discharge. The study was done as a pilot study hence sample size calculation was not done. The data obtained from these patients were analyzed using SPSS version 21.0. The data were tested for normality and compared using appropriate statistical tests. A  $P < 0.05$  was considered statistically significant.

## RESULTS

In our study, the 2 surgical ports technique was used in 30 patients whereas the 3 surgical ports technique was used for 32 patients undergoing LC in our study. There was no statistically significant difference in the demographic parameters of the patients in both the groups.

The mean age of the L2 group was 46.25 years, and the mean age of the L3 group was 47.63 years. The L2 group consisted of 22 males (73.3%) and 8 females (26.7%), and the L3 group consisted of 24 males (75%) and 8 females (25%). The mean body mass index of the IU and PU groups was 24.65 and 23.89 kg/m<sup>2</sup>, respectively. There operation time between the two groups (65.82 min for L2, 64.78 min for L3) was comparable (Table 1).

Duration of post-operative hospital stay was 6 days in both the groups IU and PU. The mean post-operative tramadol consumption was 216 mg in the L2 group and 221 mg in the L3 group (Table 2). Post-operative pain scores observed were similar in both the Groups L2 and L3. There was no incidence of wound infection or internal organ injury caused by trocar insertion in any group.

## DISCUSSION

Laparoscopy has hugely modified the basic concepts and goals of modern day surgery, reducing operative trauma, recovery time, and improving cosmetic results. These benefits have become particularly desirable in the most common surgical procedures done worldwide, such as appendectomy and cholecystectomy. Today LC currently stands as the gold standard in the treatment of

**Table 1: Demographic parameters between the Groups L2 and L3**

Variable	Group L2 (n=30)	Group L3 (n=32)	P value
Age (years)	46.25±6.75	47.63±8.35	0.47 (t)
Sex ratio (male/female)	22/8	24/8	0.89 (c)
BMI (kg/m <sup>2</sup> )	24.65±4.23	23.89±6.53	0.58 (t)
Operation time (min)	65.82±9.5	64.78±9.34	0.66 (t)

BMI: Body mass index

**Table 2: Post-operative outcomes in both Groups L2 and L3**

Variable	L2 group (n=30)	L3 group (n=32)	P value
Duration of hospital stay (days)	6	6	1 (c)
Post-operative tramadol consumption (mg)	216±35	221±45	0.62 (t)
Wound infection (%)	0	0	-
Major organ injury (%)	0	0	-

symptomatic biliary lithiasis because of its clear advantages over open cholecystectomy in reducing recovery time and post-operative pain, shortening hospital stay and allowing patients an earlier return to everyday living.<sup>3</sup> Inspired by the success obtained with conventional LC, surgeons are now even striving to further reduce the invasiveness of laparoscopy by reducing the size of the ports or their number.<sup>6</sup> laparoscopic procedures have been extensively studied and ample literature is available on it.<sup>1-3</sup> But there is no study which has compared 2 versus 3 ports LC in Indian population, so we conducted this study.

Theoretically, if surgical trauma is reduced to a minimum it will lead to improved outcomes in pain management, patient comfort, post-operative complications, and shortened hospital stay. In our opinion, the added benefit of improving cosmesis is a natural consequence of the less invasive techniques but should not be a goal by itself.<sup>7</sup> Lee *et al.*<sup>8</sup> had observed that there is no difference between 3 versus 1 ports LC regarding pain as the most important variable. This was similar to our study results where we observed no difference in the post-operative pain scores in our patients. Pain after LC has been differentiated into three components: Visceral, abdominal wall, and that referring to the shoulder.<sup>9</sup> In our study, we observed not only similar

post-operative VAS scores but also similar rescue analgesic consumption in the 48 h postoperatively. In our study, the operative time was similar in our study patients, suggesting that both 2 and 3 ports laparoscopic procedure have similar operative ease. In summary, our study does not support 2 ports over 3 ports technique for LC in terms of reduction of post-operative pain and recovery time. Multicentric trials are required to confirm our study results. This study was somewhat limited in that it was a prospective study and we did not evaluate the incidence of incisional hernia which may occur in our patients after few years. Effects of systemic disease on the wound healing such as perioperative glycemic status and body oxygen levels were not assessed.

## CONCLUSIONS

LC performed with 2 ports approach does not seem to offer any advantage over the 3 ports approach with both the techniques having similar procedure time, post-operative pain score, and post-operative rescue analgesic consumption.

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