

# Laparoscopic Cholecystectomy: What is Appropriate Position of Epigastric Port?

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## ABSTRACT

Laparoscopic cholecystectomy is a very commonly performed procedure. Position of epigastric port is preferred by some surgeons from left side of the falciform ligament, whereas others prefer from right side of ligament. In this study we have compared the ergonomics and results of two approaches by conducting the procedure upon 100 patients. The advantages and disadvantages of each technique are discussed in this report.

**Keywords:** Epigastric port, Laparoscopic cholecystectomy Port position.

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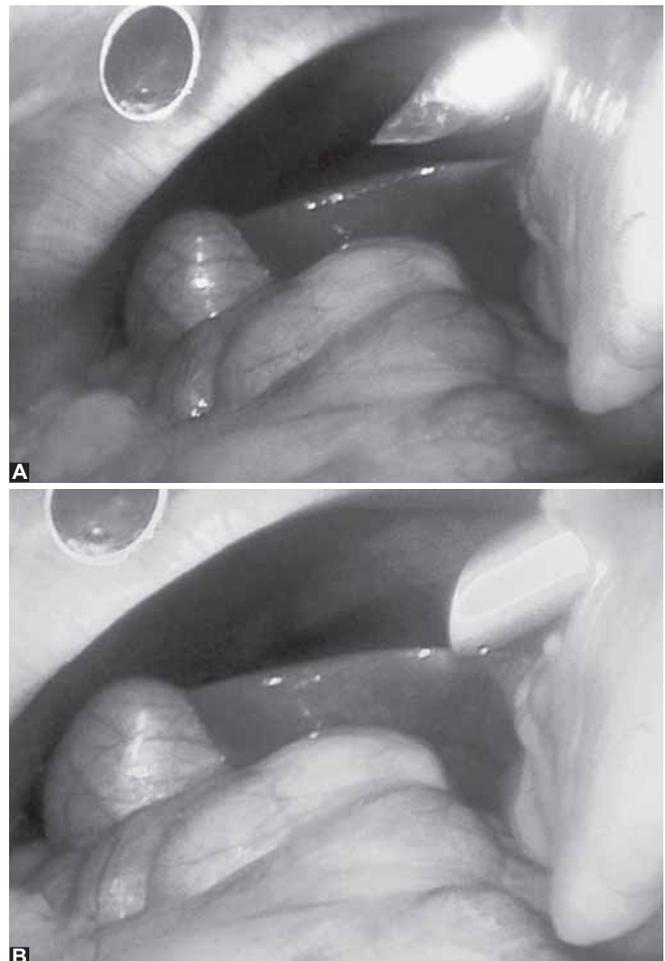
## INTRODUCTION

Laparoscopic cholecystectomy has become the gold standard technique in treatment for gallbladder disease. This is essentially a safe procedure with low complications, morbidity and mortality rate.<sup>1,2</sup> In the first decade after the advent of laparoscopic surgery both the surgeon and patient had a lot of inconvenience due to higher complication rate in patients and greater physical strain experienced by surgeons. Later on it was realized that the inconvenience can be avoided in many patients by better understanding of principles of ergonomics. One of the important is the proper port position in relation to the target organ of dissection. Although there is no controversy about the position of umbilical, right subcostal (midclavicular) and right anterior axillary ports in laparoscopic cholecystectomy,<sup>19</sup> but there is no uniform consensus about the position of epigastric port. Conventionally epigastric port is inserted to the right of falciform ligament.<sup>18,20</sup> In literature, position to the left of ligament is also mentioned.<sup>17</sup> Present study compares the ergonomics and results of left and right position of epigastric port in relation to falciform ligament in laparoscopic cholecystectomy.

## PATIENTS AND METHODS

The study was conducted upon 100 patients of laparoscopic cholecystectomy from August, 2011 to January, 2013 at our institute. Fifty patients were randomized to study group and 50 patients to conventional group. Patients having acute

cholecystitis, cardiorespiratory problems, coagulation disorders, suspected malignancy, previous abdominal surgery and pregnancy were excluded from study. A 10 mm port was introduced through infraumbilical crease and pneumoperitoneum was created by open method. A 30 telescope was used in both the groups. Epigastric port in study group, was inserted (under telescopic vision) to the left of falciform ligament after making skin incision just below the xiphoid. After entering the abdomen falciform ligament was pierced from left to right (Figs 1A and B) and port was positioned toward gallbladder. In conventional group, after making skin incision just below the xiphoid, abdomen was entered on right side of falciform ligament (Fig. 2). Position of right midclavicular port and right anterior axillary ports was same in both the groups.



**Figs 1A and B:** Insertion of epigastric trocar to the left side of falciform ligament

Intraoperative and postoperative results of two groups were compared in terms of time taken for insertion of ports and completion of procedure, subjective ease of dissection, freedom of instrument movement, difficulty in extraction of gallbladder, bile and gallstone spills, intraoperative hemorrhage, conversion rate, injury to biliary tree and organs, hospital stay and port site hernia.

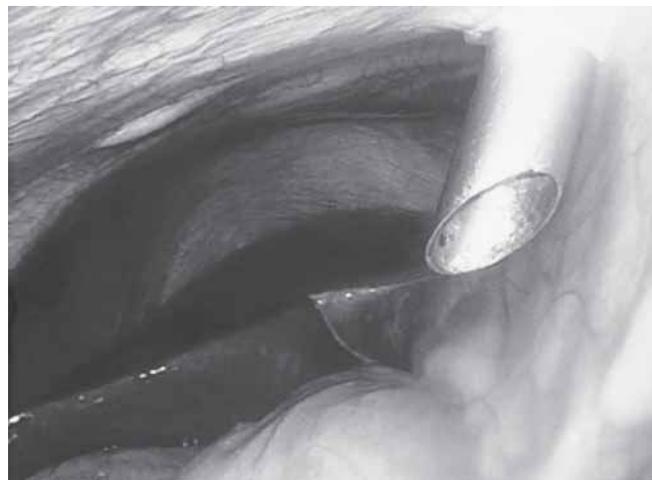
## RESULTS

Average time taken for insertion of epigastric trocar was 10 seconds in study group and 7 seconds in conventional group. However, average time taken for completion of procedure was less in study group as compared to conventional group (40 vs 55 minutes). In study group freedom of instrument manipulation and precision of movements (Fig. 3) was more as compared to that in conventional group. Intraoperative hemorrhage due to cystic artery bleed occurred in 5 (10%) cases in conventional group. Out of these 2 (4%) cases were converted to open procedure. Perforation of gallbladder due to excessive traction on fundus and Hartmann pouch occurred in 3 (6%) cases in conventional group leading to bile spillage. None of these two complications occurred in study group. Difficulty in extraction of gallbladder (Figs 5A and B) was experienced in 18 (36%) cases in study group and 11 (22%) cases of conventional group. This was due to impaction of gallbladder due to large size of stones. In such cases extraction of gallbladder was facilitated by extension of fascial incision and dilatation of tract. Gallstone spillage occurred in falciform ligament in 5 (10 %) case of study group. Average hospital stay was 2.5 days in both the groups. There was no complication like bile duct injury, visceral organ injury and complaint of trocar site hernia in either of the two groups.

## DISCUSSION

It was for the first time in the history of laparoscopic surgery when, Kelling introduced a visualizing scope in the peritoneum of a dog in 1901.<sup>5</sup> It took another 8 decades for a perfect laparoscopic technique to develop, when for the first time, Mouret<sup>6</sup> performed a successful laparoscopic cholecystectomy in 1987. Laparoscopic surgery provides less pain for the patient but is more demanding for the surgeon.<sup>3</sup> Neck pain and spondylosis has been observed to be recurring complaint among surgeons in high volume centers in first decade after the advent of minimal access surgery.<sup>7</sup> Other physical constraints reported are cervical spondylitis, shoulder pain, backache, hand finger joint pain, tenosynovitis and stress exhaustion.<sup>8,9</sup> Surgical procedures are mentally and physically demanding and stress during surgery may compromise patient safety.<sup>4</sup> Ergonomic integration and suitable operating room environment are

necessary to improve efficacy, safety and comfort for the operating team. The term ergonomics is derived from Greek words *ergon* meaning work and *nomos* meaning arrangement. Ergonomics is the scientific study of the people at work.<sup>3</sup>



**Fig. 2:** Trocar inserted to the right of falciform ligament



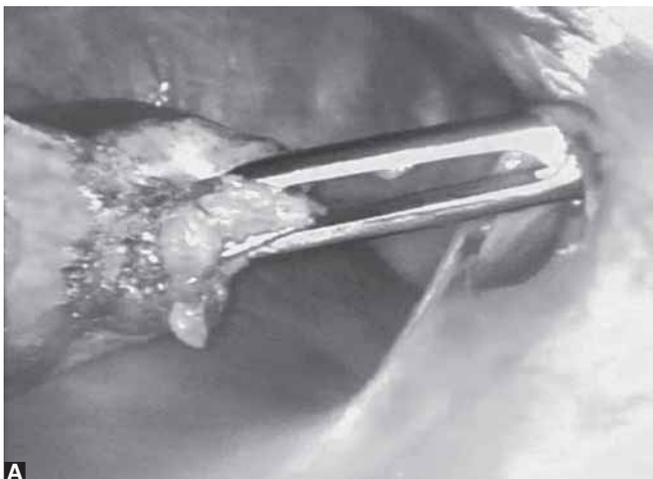
**Fig. 3:** Freedom of instrument manipulation in study group



**Fig. 4:** Working angle in study group

There is no uniform consensus about the epigastric trocar placement in laparoscopic cholecystectomy. In literature of laparoscopic cholecystectomy some authors recommend the placement of epigastric trocar from left side of falciform ligament whereas others recommend from the right side of ligament.<sup>17,18,20</sup> To facilitate smooth instrument manipulation along with adequate visualization during laparoscopic surgery, usually trocars are placed in triangular fashion. The target organ should be 15 to 20 cm from the center port used for optical trocar. The two remaining ports are placed in the same 15 to 20 cm arch at 5 to 7 cm on either side of optical trocar. This allows the instruments to work at 60 to 90° angle.<sup>10</sup> For the best task efficiency manipulation angle from 45 to 75°, with equal azimuth angle is recommended.<sup>11</sup>

In our study average duration of operation was less in study group than in conventional group. It was also less than that (i.e. 43.4 minutes) experienced by Hasbahceci et al in their study.<sup>12</sup> Average hospital stay in both the groups was same (2.5 days) and was comparable to other studies.<sup>13</sup> By putting epigastric trocar on left side of falciform ligament, we could get a better manipulation angle (Fig. 4). There



**Figs 5A and B:** Difficult extraction of gallbladder

was greater freedom of instrument manipulation and comparative ease of dissection in study group, which resulted in comparative short duration of operation and fewer complications than conventional group and other studies.<sup>14</sup> A common problem of difficult extraction of stone-filled gallbladder as experienced by Lange et al and Bordelon et al in their study<sup>15,16</sup> was encountered in both the groups. This could be overcome by extension of facial incision.

## CONCLUSION

In laparoscopic cholecystectomy, epigastric port when inserted to the left of falciform ligament gives better ergonomics than from right of ligament. This position gives greater freedom and precision for instrument movements making the procedure efficient, easier and safe. Difficulty in extraction of stone-filled gallbladder can be overcome by extension of fascial incision.

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