

# Umbilical port versus epigastric port for gallbladder retrieval in laparoscopic cholecystectomy: An intervention study



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## ABSTRACT

**Background:** Open cholecystectomy as a routine operation once for cholecystitis and cholelithiasis is no more a routine practice. Laparoscopic cholecystectomy (LC) is one of the most common surgeries done these days and has become the gold standard for the treatment of symptomatic cholelithiasis. **Aims and Objectives:** The aim of the study was to compare the retrieval of gallbladder (GB) between epigastric port and umbilical port as two approaches of LC in terms of the time taken to remove GB, pain, and other complications postoperatively. **Materials and Methods:** An intervention study was conducted in the general surgery department between June 2022 and May 2023 among 73 patients who were admitted for cholecystectomy recruited by a total consecutive sampling method. Patients were put into two modalities of retrieval of GB by performing the two methods alternately. Templates were generated in MS Excel sheet and analysis was done. Appropriate statistical tests were used and the  $P < 0.05$  was taken as significant. **Results:** There was no significant difference in the mean age ( $P = 0.21$ ) of patients as well as the mean duration of surgery ( $P = 0.07$ ) through epigastric port as compared to umbilical port. Patients who had undergone retrieval of GB through epigastric port ( $P = 0.04$ ) had significantly lesser pain at 6 h post-operation as compared to epigastric port. The overall pain scores were lesser when extraction of GB was done through epigastric port in comparison with umbilical port. The post-operative complications in terms of infection, hernia was lesser in patients undergoing extraction of GB through epigastric port. **Conclusion:** Epigastric port could be better as compared to umbilical port for retrieval of GB with respect to mean duration, post-operative pain and herniation from port site, and also surgical site infection.

**Key words:** Umbilical; Epigastric; Cholecystectomy; Laparoscopic

## INTRODUCTION

Gallbladder (GB) issues have been recognized since antiquity. People have struggled with cholelithiasis for more than 2000 years. Jean-Louis Petit, who developed GB surgery in 1733, advised gallstone removal and GB drainage, which were successfully carried out on patients with empyema in 1743. Langenbuch's open cholecystectomy served as the gold standard for treating symptomatic cholelithiasis for more than a century.<sup>1</sup> The second most common surgical surgery carried out today is a cholecystectomy, which is the

most often done operation on the bile tract.<sup>1</sup> It is no longer common practise to perform an open cholecystectomy as a standard procedure once for cholecystitis and cholelithiasis.<sup>2</sup> A new chapter in the history of surgery was created with the invention of laparoscopy.<sup>3</sup> Since its invention in 1985 by Professor Dr. Eric Muhe, laparoscopic cholecystectomy (LC) has been the gold standard treatment for gallstone disease.<sup>4,5</sup> all over the world.<sup>2</sup> By lowering post-operative discomfort, surgical infection risk, incisional hernia risk, and hospital stay, it has revolutionized the surgical management of gallstone disease.<sup>6,7</sup> Due to the shorter hospital stay,

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earlier return to work, and overall lower cost, this procedure is preferable to an open cholecystectomy.<sup>8</sup> Depending on the surgeon's preference, his or her experience, and their level of expertise, it may be carried out with a single, two, three, or four ports (3, 5, or 10 mm in size). After the procedure, retrieving the GB specimen requires the equipment to be positioned correctly (rail-roading).<sup>9</sup> After a LC, the most common complaint is pain, which also frequently leads to a longer hospital stay.<sup>10</sup> Infection at the port site can be hazardous for both the patient and the surgeon. Minor infections resolve with suture removal, but deep-seated infections affect the port system as a whole. Due to the difficulty in removing the infection from the epigastric port, the issue is significantly more challenging. Almost often, retrieving a GB that is severely swollen or inflamed and full of stones is problematic. In these circumstances, GB removal necessitates either an extension of one of the fascial incisions to facilitate GB retrieval or a needle decompression, stone fragmentation, and stone removal from the GB close to the port site, all of which increase post-operative pain at the port site.<sup>11</sup> The final step of LC is the safe removal of the GB through one of the ports. Alternatives are currently being researched, though, including more recent, less invasive procedures such as single incision LC and natural orifice transluminal endoscopic surgery.<sup>12</sup>

Either the umbilical port or the epigastric/subxiphoid port can be used to remove the GB.<sup>13</sup> However, it is debatable which port should be used.

### Aims and objectives

To compare the retrieval of gallbladder between epigastric and umbilical port as two approaches of laparoscopic cholecystectomy in terms of time taken to remove gallbladder, pain and other complications postoperatively.

## MATERIALS AND METHODS

A prospective cohort study was conducted among 73 patients admitted to the surgery department of a tertiary care hospital of West Bengal for a total duration of 12 months (June 2021–May 2022) who have met the inclusion and the exclusion criteria after Ethical Committee approval.

### Inclusion criteria

The inclusion criteria comprised patients above the age of 18 years, diagnosed with cholelithiasis or cholecystitis.

### Exclusion criteria

Exclusion criteria were as follows – patients who did not give consent to be a part of study, patients diagnosed

with carcinoma GB, and patients who were lost to follow-up. The recruitment of patients was done by total consecutive sampling. All the patients underwent LC but they were randomly divided into two groups according to the modality of GB retrieval. Patients were put into two modalities of retrieval of GB by performing the two methods alternatively; hence, the total patients in epigastric approach were 37, and that into umbilical approach was 36.

### Pre-operative work up

Routine blood investigations such as complete blood count, serum glutamic-oxaloacetic transaminase, serum glutamic pyruvic transaminase, PT, and urine examination were carried out in all 73 patients. Ultrasound of the abdomen was done in all patients when they presented in the out-patient department or the emergency with complaints suggestive of cholelithiasis or cholecystitis.

### Procedure

Surgery was performed under general anesthesia. Access to peritoneal cavity and creation of pneumoperitoneum was performed, and abdomen was insufflated with carbon dioxide. Trocars were inserted. GB was retracted superolateral and its infundibulum was grasped, retracting it inferolaterally to open Calot's triangle. Cystic duct and cystic artery were identified and dissected out from surrounding tissue. Calot's triangle was visualized for any abnormal variant artery or duct and then cystic duct and cystic artery were clipped and divided. GB was dissected from liver bed with cautery. While performing GB retrieval through epigastric port two 10 mm ports inserted at infraumbilical (open technique) and epigastric regions (closed technique) and during GB retrieval through umbilical port, a 5 mm epigastric port was made along with a 10 mm umbilical port. If an epigastric port was to be used for GB retrieval, it was dilated with a metallic dilator to facilitate GB retrieval. On the other hand, if GB was retrieved through an umbilical port, the telescope was shifted to epigastric port to facilitate GB retrieval through umbilical wound. In both the groups, if GB was found distended or contained a large stone, it was opened at the time of retrieval, and bile was suctioned (and/or stone was retrieved) under vision. Retrieval of GB was done through endobag. A negative pressure closed wound drain was placed in GB fossa post-retrieval. Hemostasis was ensured followed by closure of rectus with absorbable suture (vicryl) and skin closure with non-absorbable sutures (Nylon).

### Post-operative assessment

Post-operative port site pain was assessed with Visual Analog Scale (VAS) ranging from 0 to 10. Pain was assessed in every patient at 1, 6, 12, 24, and 36 h postoperatively. Data regarding port used for retrieval of GB, time taken to retrieve, port site infection, and post-operative pain

were recorded and compared for both groups. Entry of data was done in MS Excel sheet, and analysis was done using SPSS software version 20. Variables were presented as frequency and percentages and a comparison between the two groups was done using appropriate statistical test available in SPSS software. The value of  $P < 0.05$  was taken as statistically significant.

## RESULTS

At the end of the study, it was observed that there was no significant difference in the mean age ( $P=0.21$ ) of patients as well as the mean duration of surgery ( $P=0.07$ ) through epigastric port as compared to umbilical port which is presented in Table 1. Furthermore, no significant association has been seen between gender ( $P=0.38$ ) or indication for undergoing LC ( $P=0.59$ ) and mode of resection of the GB. Table 2 depicts the post-operative pain as perceived by the patient, where it can be seen that patients who had undergone removal of GB through epigastric port ( $P=0.04$ ) have significantly lesser pain at 6 h post-operation as compared to umbilical port. The overall pain scores were lesser when retrieval of GB was done through epigastric port as compared to that

of umbilical port. The post-operative complications observed in patients in both the groups were similar and no significant difference has been observed which is depicted in Table 3. Figure 1a and b show the real-time picture of LC.

## DISCUSSION

The extremely common and secure LC can be performed on patients with acute cholecystitis.<sup>8</sup> However, there is disagreement over the best location for GB removal. In addition, connected to increased tissue stress at the port site and resulting in a substantial degree of post-operative discomfort at the port site is GB removal through a particular port. The best port for this function will therefore be the one with the least amount of post-operative port site pain and infection.<sup>8</sup> The post-operative pain computed through VAS score observed in the present study was significantly lower for epigastric port at 6 h post-operation which is in contrast to the findings of Siddiqui et al.,<sup>7</sup> where the at 1, 6, 12, 24, and 36 h following surgery, the VAS for pain at the epigastric port was lower than the umbilical port ( $4.8 \pm 2.1$  vs.  $5.2 \pm 1.80$ ;  $2.9 \pm 1.6$  vs.  $3.8 \pm 0.72$ ;

**Table 1: Comparison of variables between the two groups (Overall n=73)**

S. No	Variable	Epigastric port (n=37)	Umbilical port (n=36)	P-value
1	Age in years (mean age)	42.72±8.42	46.12±11.8	0.21
2	Gender**			
	Male	14	11	0.38
	Female	23	25	
3	Indication			
	Cholecystitis	32	34	0.59
	Cholelithiasis	5	2	
4	Duration of surgery in minutes* (mean duration)	56±13.2	58.7±14.4	0.07

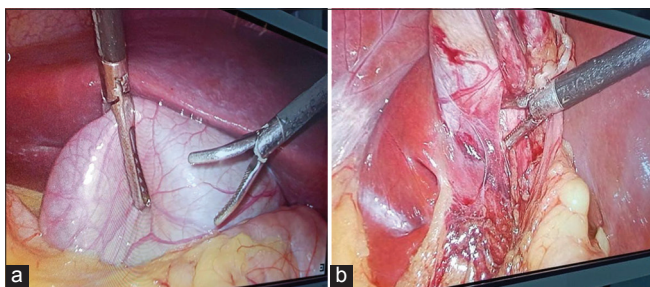
\*t-test, \*\*Binary logistic regression

**Table 2: Post-operative pain as perceived by the patient (Overall n=73)**

S. No.	Pain (at period post-operative)	Epigastric	Umbilical	P-value
1	1 h	4.8±2.1	5.2±1.80	0.07
2	6 h	2.9±1.6	3.8±0.72	0.04
3	12 h	3.2±0.81	4.1±0.63	0.21
4	24 h	2.9±0.71	2.1±0.62	0.09
5	36 h	1.1±0.15	1.7±0.49	0.18

**Table 3: Post-operative complications (Overall n=73)**

S. no.	Post-operative complications	Epigastric		Umbilical port		P-value	
		Frequency	% Age	Frequency	% Age		
1	Infection	Week 1	3	8.1	5	13.8	0.87
		Week 2	2	5.4	3	8.3	
		Week 3	2	5.4	4	11.1	
		Week 4	1	2.7	2	5.5	
			0	0	3	8.3	
2	Hernia	0	0	3	8.3	1.00	



**Figure 1:** (a and b) Procedure of laparoscopic cholecystectomy

3.2±0.81 vs. 4.1±0.63; 2.9±0.71 vs. 2.1±0.62; 1.1±0.15 vs. 1.7±0.49 respectively), and the difference was statistically significant ( $P<0.001$ ). The mean duration required for the resection of GB was 58.7±14.4 min in umbilical port and 56±13.2 min in epigastric port. This difference was not significant ( $P=0.07$ ); hence, based on this finding, we cannot conclude as to which port is better for the extraction of GB. This finding is in contrast to a study by Ahmad et al.,<sup>2</sup> where mean time for GB delivery was 10.43±4.5 min in sub xiphoid group while 8.67±3.8 in umbilical group showing a non-significant difference in both groups ( $P=0.109$ ). This also shows that difficulty level for delivery of GB is almost equal. The incidence of port site infection observed in the current study was 19 out of 73 (26.03%) out of which infection occurred in eight patients who underwent retrieval by epigastric port and 11 of those who underwent retrieval by umbilical port developed infection whereas in another study by Shakya et al.,<sup>8</sup> Eight patients out of 200 had port site infections, which is a relatively low number compared to the current study. The incidence of port site infection seen by Shakya et al., was higher in the epigastric port compared to the umbilical port, which is surprising given the current study's findings that infection occurred more frequently during retrieval through umbilical port.

### Limitations of the study

The limitations of study is lesser number of sample size and improper randomization of the patients. A proper randomized controlled trial with larger patient population will further validate the superiority of one port over the other in terms of complications after LC

### CONCLUSION

The present study was undertaken to compare between umbilical port versus epigastric port for retrieval of GB in patients undergoing LC. Based on the findings of the study, it may be concluded that epigastric port could be better as compared to umbilical port for extraction of GB as the mean duration required for surgery, post-operative

pain, as well as incidence of port site herniation, was lesser when GB was extracted through epigastric port; however, larger studies conducted on the same topic may give a better conclusion in this regard.

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**Authors' Contribution:**

**SJ**- Definition of intellectual content, literature survey, prepared the first draft of manuscript, implementation of the study protocol, data collection, data analysis, manuscript preparation and submission of article; **SMNJ**- Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision; **IH**-Design of study, statistical analysis and interpretation.

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