

A Comparative Study of Post-Operative Pain at Port-Site After Gallbladder Retrieval From Umbilical Ports Versus Epigastric Ports in Laparoscopic Cholecystectomy

Laparoscopic Cholecystectomy via Umbilical and Epigastric Ports after Gallbladder Removal

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ABSTRACT

Objective: To evaluate the difference in the results of laparoscopic cholecystectomy performed via umbilical and epigastric ports after gallbladder removal.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at the department of Surgery, Central Park Teaching Hospital, Lahore from January 2023 to June 2023.

Methods: Data collection: 100 patients; 50 in each group fulfilling selection criteria were enrolled for the study and were randomly divided in two groups. Time taken for retrieval of gallbladder, post-operative pain, bleeding, complete wound healing, re-operation were noted during follow-up. SPSS v. 25 was used to analyse the data.

Results: Mean age of the patients in umbilical port group was 44.96 ± 16.63 years and in gastric port group was 43.40 ± 15.21 years. In umbilical port group, the mean time for retrieval of gall bladder was observed as 3.96 ± 0.83 minutes and in gastric port group was 5.80 ± 1.20 minutes ($p < 0.001$). In umbilical port group, the mean pain score after 24 hours was 3.20 ± 0.89 and in gastric port group was 4.74 ± 1.16 ($p < 0.001$).

Conclusion: Umbilical port gall bladder retrieval is preferable to gastric port because it requires less time in surgery, causes less discomfort, and has a higher rate of success.

Key Words: post-operative pain, port-site, gallbladder retrieval, umbilical ports, epigastric ports, laparoscopic cholecystectomy

Citation of article: Rauf H, Khalid W, Batool A, Murtaza M, Mian A, Shahid M, A Comparative Study of Post-Operative Pain at Port-Site After Gallbladder Retrieval From Umbilical Ports Versus Epigastric Ports in Laparoscopic Cholecystectomy. Med Forum 2024;35(9):21-25. doi:10.60110/medforum.350905.

INTRODUCTION

Laparoscopic cholecystectomy is a minimally invasive surgical method used to remove the gallbladder.¹ Acute and chronic inflammation of the gallbladder, symptomatic presence of gallstones, abnormal gallbladder movement, inflammation of the gallbladder without the presence of gallstones, inflammation of the pancreas caused by gallstones, and abnormal growths in

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Received: March, 2024

Accepted: June, 2024

Printed: September, 2024

the gallbladder are all indications for considering a laparoscopic removal of the gallbladder. It is recommended to do an open cholecystectomy for the same reasons.²

Open cholecystectomy is generally the most efficacious approach for treating gallbladder cancer in the majority of cases. Approximately 20% of the population in the United States is affected by gallstones. Approximately 300,000 individuals get cholecystectomies annually.³ Approximately 10% to 15% of the population is affected by gallstones without experiencing any symptoms. Twenty percent of these instances manifest symptoms, specifically biliary colic. Complications, such as acute cholecystitis, gallstone pancreatitis, choledocholithiasis, and gallstone ileus, afflict between 1% to 4% of the 20% of patients who experience symptoms.⁴ The incidence of gallstones is higher in the senior population, with a higher likelihood of occurrence in females compared to males. The primary constituents of gallstones are predominantly cholesterol (about 75%) and pigments (25%). Gallstones, regardless of their composition, exhibit identical clinical signs.¹⁻⁴

After a laparoscopic cholecystectomy, it is common for patients to have increased discomfort and infection at the incision site since the gallbladder must be removed before the incision can be closed. Perforation of the gallbladder wall and leakage of bile in wound might derail an otherwise routine cholecystectomy.^{5,6} There is insufficient data to make a well-informed decision on where to make the incision for gallbladder removal.⁷ Thus, this research was designed to be conducted in a local context in order to gather evidence supporting a more suitable technique for gall bladder retrieval, with the aim of replacing the less efficient or sluggish methods now employed in ordinary practice.

METHODS

A cross-sectional study was conducted at department of surgery, Central Park Teaching Hospital, Lahore from January 2023 to June 2023 with the objective of comparison of post operative pain in gall bladder retrieval from umbilical and epigastric ports after approval of institution review board (CPMC/IRB-No/1382A) of Central Park Medical College. Sample size (n_x) of 100 patients; 50 in both groups was estimated by keeping the 95% confidence level, 90% power of study and mean pain score after 1 hour was 5.500 ± 1.176 with umbilical port and 6.640 ± 1.494 with gastric port.⁸ Patients aged between 20-70 years, both gender diagnosed with cholelithiasis were enrolled in the study. Gallbladder malignancy, bleeding diatheses, prior abdominal drain installation, obstructive jaundice, acute pancreatitis, and prior port-site extension were all reasons to exclude a patient from the study.

One hundred patients who met the specified criteria were enrolled from the wards of the Department of Surgery. Explicit consent was acquired from all the patients. The demographic information of each patient, such as their name, age, gender, BMI, duration of cholelithiasis, duration of stone size, hypertension, smoking, diabetes, and ASA, was recorded. The patients were randomly allocated into two equal groups using a random number table. In group A, gall bladder was retrieved through umbilical port after removing gall bladder stone. In group B, gall bladder was retrieved through gastric port after removing gall bladder stone. Patients with standard elective four port laparoscopic cholecystectomy for benign gall bladder diseases (symptomatic gallstones, gall bladder polyps) were underwent surgery. The procedures were performed under general anaesthesia by a single surgical team, with the help of a researcher. Intraoperatively, time for gall bladder retrieval and bleeding were noted. Then patients will be shifted to post-surgical wards and were followed-up for 72 hours.

Statistical Analysis: SPSS version 25.0 was used for entry of data and analysis. Both groups were compared for mean pain score by using independent samples t-test

and for efficacy by using chi-square test. P-value ≤ 0.05 as significant.

RESULTS

In this study, we enrolled a total of 100 patients and randomly assigned them to two equal groups. Average age of the patients in umbilical port group was 44.96 ± 16.63 years, while average age of the patients in stomach port group was 43.40 ± 15.21 years. The umbilical port group consisted of 29 men (58.0%) and 21 females (42.0%) while in the gastric port group consisted of 17 men (34.0%) and 33 females (66.0%). The average BMI of patients in the umbilical port group was 31.05 ± 5.03 kg/m². The average BMI of patients in the gastric port group was 29.96 ± 4.74 kg/m². In umbilical port group, about 24 (48.0%) patients had ASA I and 26 (52.0%) patients had ASA II. In gastric port group, about 28 (56.0%) patients had ASA I and 22 (44.0%) patients had ASA II.

Table No. 1: Baseline characteristics of enrolled patients in both port groups

	Group	
	Umbilical port	Gastric port
n	50	50
Age (years)	44.96 ± 16.63	43.40 ± 15.21
Gender		
Male	29 (58.0%)	17 (34.0%)
Female	21 (42.0%)	33 (66.0%)
BMI (kg/m ²)	31.05 ± 5.03	29.96 ± 4.74
ASA		
I	24 (48.0%)	28 (56.0%)
II	26 (52.0%)	22 (44.0%)
Duration of symptoms (months)	17.02 ± 9.66	18.22 ± 9.62
Stone size (mm)	5.76 ± 2.73	5.42 ± 2.89
Hypertension		
Yes	28 (56.0%)	25 (50.0%)
No	22 (44.0%)	25 (50.0%)
Diabetes		
Yes	27 (54.0%)	22 (44.0%)
No	23 (46.0%)	28 (56.0%)
Smoking		
Yes	19 (38.0%)	14 (28.0%)
No	31 (62.0%)	36 (72.0%)

The mean duration of gall stone disease was 17.02 ± 9.66 months in patients in umbilical port group and 18.22 ± 9.62 months in gastric port group. The mean size of stone was 5.76 ± 2.73 mm in patients in umbilical port group and 5.42 ± 2.89 mm in gastric port group. In the umbilical port group, 28 individuals (56.0%) had a positive history of hypertension, while 22 individuals (44.0%) were normotensive. In the gastric port group, 25 individuals (50.0%) were

hypertensive, while the remaining 25 individuals (50.0%) were normotensive. Within the umbilical port group, 27 individuals (54.0%) had a positive history of diabetes, while 23 individuals (46.0%) did not have diabetes. Among the gastric port group, 22 individuals (44.0%) had a positive history of diabetes, while 28 individuals (56.0%) did not have diabetes. In the umbilical port group, 19 individuals (38.0%) had a positive history of smoking, while 31 individuals (62.0%) were non-smokers. In the gastric port group, 14 individuals (28.0%) had a positive history of smoking, while 36 individuals (72.0%) were non-smokers. Table – 1.

Table No. 2: Comparison of the surgical outcomes in both port groups

Outcome	Group		Significance level
	Umbilical port	Gastric port	
Time to retrieve gall bladder (min)	3.96 ± 0.83	5.80 ± 1.20	<0.0001
Pain after 1 hour	5.68 ± 1.15	6.72 ± 1.05	<0.0001
Pain after 6 hours	4.08 ± 0.83	5.32 ± 1.08	<0.0001
Pain after 12 hours	3.80 ± 0.83	5.42 ± 1.16	<0.0001
Pain after 24 hours	3.20 ± 0.89	4.74 ± 1.16	<0.0001
Need for re-exploration			
Yes	2 (4.0%)	8 (16.0%)	0.046
No	48 (96.0%)	42 (84.0%)	
Post-surgical infection			
Yes	1 (2.0%)	7 (14.0%)	0.027
No	49 (98.0%)	43 (86.0%)	
Hospital stay after surgery (days)	3.04 ± 0.81	3.98 ± 0.82	<0.0001

In umbilical port group, the mean time for retrieval of gall bladder was observed as 3.96 ± 0.83 minutes. In gastric port group, the mean time for retrieval of gall bladder was observed as 5.80 ± 1.20 minutes (p < 0.001). In umbilical port group, the mean pain score after 1-hour was 5.68 ± 1.15. In gastric port group, the mean pain score after 1-hour was 6.72 ± 1.05 (p < 0.001). In umbilical port group, the mean pain score after 6-hours was 4.08 ± 0.83. In gastric port group, the

mean pain score after 6-hours was 5.32 ± 1.08 (p < 0.0001). In umbilical port group, the mean pain score after 12-hours was 3.80 ± 0.83. In gastric port group, the mean pain score after 12-hours was 5.42 ± 1.16 (p < 0.001). In umbilical port group, the mean pain score after 24 hours was 3.20 ± 0.89. In gastric port group, the mean pain score after 24 hours was 4.74 ± 1.16 (p < 0.001). In the group of patients with an umbilical port, re-exploration was required in 2 patients (4.0%). In the group with a stomach port, re-exploration was needed in 8 patients (16.0%) that was significant (p < 0.05). Among the patients in the umbilical port group, there was an infection in 1 instance, which represents a rate of 2.0%. In the stomach port group, 7 patients (14.0%) experienced post-surgical infection. The difference between the two groups was statistically significant, with a p-value of less than 0.05. The average duration of hospitalisation following surgery in the umbilical port group was 3.04 ± 0.81 days. The average duration of hospitalisation after surgery in the gastric port group was 3.98 ± 0.82 days (p < 0.001). Table – 2.

DISCUSSION

The most effective therapy for gallstone symptoms is laparoscopic cholecystectomy. The most common side effect reported by patients after laparoscopic cholecystectomy is pain. After a laparoscopic cholecystectomy, incisional discomfort is more prominent than visceral pain during the first 48 hours.⁹ In umbilical port group, the mean time for retrieval of gall bladder was observed as 3.96 ± 0.83 minutes. In gastric port group, the mean time for retrieval of gall bladder was observed as 5.80 ± 1.20 minutes (p < 0.001). In umbilical port group, the mean pain score after 24 hours was 3.20 ± 0.89. Hajong et al., found that when comparing the pain scores at 1 h after surgery, those at the epigastric port were significantly higher than those at the umbilical port were (6.640 ± 1.494 vs. 5.500 ± 1.176), after 6 h was (6.620 ± 1.549 vs. 5.320 ± 1.188), after 12 h was (6.100 ± 1.549 vs. 4.660 ± 1.232), and after 24 h was (5.250 ± 1.459 vs. 3.970 ± 1.274). However, in the umbilical group, gall bladder removal took much longer (4.94 1.56 vs. 3.24 1.29).⁸ However, Bashir et al. showed that there was no significant difference in postoperative pain scores at 24 hours between the two groups (p value > 0.05), despite the fact that they included 94 patients and noted a significant difference in mean time for gall bladder retrieve (p value = 0.032). It was determined that there is no discernible difference between the two ports.¹¹ In a similar study, Jain et al. found that patients reported significantly less pain at the umbilical port than they did at the epigastric port simultaneously (p<0.05): mean pain scores at the umbilical port were 5.20 + 0.86, 4.60 + 0.74, 4.00 + 0.53, 3.40 + 0.08, and 2.73 + 0.82, respectively, across all time intervals.¹²

We performed a thorough systematic review and meta-analysis of comparative trials since there is debate about which port location is best for gallbladder extraction after laparoscopic cholecystectomy. We found that 2,394 patients had laparoscopic cholecystectomy with gallbladder extraction via umbilical (n= 1194) or epigastric (n= 1200) port in five randomized trials and one prospective cohort research. There was a moderate decrease in discomfort after 24 hours after gallbladder removal via umbilical port and epigastric port ($p>0.05$). However, after doing a sensitivity analysis in which the most influential source of variability was taken out of the equation, the VAS decrease after 24 hours became statistically significant.¹³⁻¹⁶

The results suggest that using a metallic-dilator, aggressively stretching the muscles & sheath, and breaking the skin are all linked with an increased risk of complications. Contrarily, umbilical port is often put by an open approach, resulting in a comparatively broader port-site that makes gallbladder removal easier by requiring less patient bending. In first 48-hours of laparoscopic procedure, the incisional pain that is reason of 70% of discomfort, has been observed to be more prominent than visceral pain. Consequently, it may be possible to have less discomfort immediately after a laparoscopic cholecystectomy if the gallbladder is retrieved with as little tissue stress as possible.^{16, 17}

In our study, infection occurred in 1 (2.0%) case in umbilical port group, while in gastric port group, 7 (14.0%) patients had post-surgical infection (p -value < 0.05). The infection rate among the umbilical and epigastric groups was similarly low. The follow-up time in the included studies is not long enough to reliably evaluate the outcome of port-site hernia. When the gallbladder is removed laparoscopically, there is a greater chance of bile leakage, stone implantation, and port-site infection. This is especially problematic for the epigastric port since infection there is notoriously difficult to eradicate. Some suggest that the risk of a challenging epigastric port-site infection may be mitigated by switching positions and passing the laparoscope camera via the umbilical port during gallbladder removal when using the umbilical port.^{11, 18, 19}

CONCLUSION

Umbilical port gall bladder retrieval is linked with shorter operation times, less discomfort, and higher success rates than stomach port gall bladder retrieval. In the future, we may utilize the umbilical port instead of the stomach port to remove the gall bladder, which will result in faster patient recovery and a higher quality of life.

Author's Contribution:

Concept & Design of Study: Hafsa Rauf

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 Final Approval of version: By all above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No.CPMC/IRB-No/1382A dated 11.01.2023

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