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A Comparative Prospective Study of 5 mm Epigastric Port Vs 10 mm Epigastric Port in Laparoscopic Cholecystectomy at Tertiary Care Center

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Abstract

Background: Now a days laparoscopic cholecystectomy (LC) becomes gold standard procedure for symptomatic gallstone disease, worldwide. Now a days minimally invasive techniques are being accepted drastically in whole world. In past few years surgeons had great efforts in making this conventional four port LC more minimal invasive and less postoperative painful by reducing numbers and size of ports like, Three ports LC (10mm umbilical,10 mm epigastric port, 5mm working port), Two port LC, SILS (Single Incision Laparoscopic Surgery) & using 5 mm epigastric port instead of 10 mm etc.

Aims and Objectives: Minimizing size of epigastric port from 10 mm to 5 mm in conventional four port laparoscopic cholecystectomy will lead to less postoperative pain, less chance of port site bleeding and infection, less requirement of postoperative analgesic dose and more satisfaction in cosmetic purpose without compromising the advantages of most popular 4 port LC with easy reproducibility.

Material and Methods: This study was conducted in GMERS Medical College and Civil Hospital, Sola,

Ahmedabad, Gujarat, India from February 2022 to February 2023 for a period of one year. 50 patients were diagnosed as symptomatic gallbladder stone disease clinically and radiologically, were included in this study after taking written informed consent. These patients were randomly divided into two groups equally (Group A and Group B). In group A patient we used 10 mm epigastric port and in group B patients we used 5 mm epigastric port. Rest 3 ports, one 10 mm umbilical port (for 30°telescope), one 5 mm port in right hypochondrium midclavicularline (working port), another 5 mm port in right lumbar region (for gallbladder fundus retraction) were same in both groups A and B.

Results: By reducing the size of epigastric port from 10 mm to 5 mm, we can reduce postoperative port site pain, postoperative requirement of analgesics, operating time, port site bleeding and port site hernia etc with good patients' satisfaction and cosmetic outcomes.

Conclusion: Using 5 mm epigastric port instead of 10 mm in LC, we can make conventional four port laparoscopic cholecystectomy surgery more satisfactory for patients in terms of less postoperative pain with low analgesic requirement and good cosmetic outcomes.

Keywords: Laparoscopic Cholecystectomy, 5mm Epigastric Port, Minimal Invasive Surgery

Introduction

Now a days laparoscopic cholecystectomy (LC) becomes gold standard procedure for symptomatic gallstone disease, worldwide. Advantages of LC over open cholecystectomies are less invasiveness, early postoperative recovery, better cosmetic outcomes, less postoperative pain, less hospital stay, less postoperative morbidities like surgical site infection (SSI), wound dehiscence, incisional hernia etc, earlier return to routine activities. First LC was done in 1985, since then bigger changes happened in technique of doing LC till date. Now a days minimally invasive techniques are being accepted drastically in whole world. In conventional cholecystectomy four ports are being used, 10 mm umbilical port (for 30° telescope), another 10 mm epigastric port (working port), 5 mm port in right hypochondrium midclavicularline (working port), another 5 mm port in right lumbar region (for gallbladder fundus retraction). But in past few years surgeons had great efforts in making this conventional four port LC more minimal invasive and less postoperative painful by reducing numbers and size of ports like, Three ports LC (10 mm umbilical, 10 mm epigastric port, 5 mm working port), Two port LC, SILS (Single Incision Laparoscopic Surgery) and using 5 mm epigastric port instead of 10 mm etc. Main stay of doing this is to minimize postoperative port site pain, infections, risk of port hernia, hospital stay, analgesic dose requirement and more satisfactory cosmetic outcome. The aim behind conducting this study is same. Minimizing size of port used to perform LC attempts to build on the improvements in postoperative pain control, early return to routine activities, patients' satisfaction and cosmetic result.

Aims and Objectives

In Conventional laparoscopic cholecystectomy, four ports are inserted for removal of gallbladder: two 5mm and two 10 mm ports. We will use 5 mm epigastric port instead of 10 mm.

- Minimizing size of epigastric port will lead to less postoperative pain
- Less chance of port site bleeding and infection.
- Less requirement of postoperative analgesic dose.

- More satisfaction in cosmetic purpose.

Material and Methods

This study was conducted in GMERS Medical College and Civil Hospital, Sola, Ahmedabad, Gujarat, India from February 2022 to February 2023 for a period of one year. 50 patients were diagnosed as symptomatic gallbladder stone disease clinically and radiologically, were included in this study after taking written informed consent.

Study design: Interventional study

Inclusion Criteria

All patients which are medically fit for laparoscopic cholecystectomy.

Exclusion Criteria

Patients with age < 18 years and patients who did not give consent for study.

Sample size: 50

Invasive procedure and Investigations: As routine

Statistical Analysis of study: As per standard statistical tools

Ethical Issues

Consent: Informed written consent was taken after persuading the participants about the possible benefits and complications of the study.

Confidentiality: Maintained as per the ICMR guidelines. Strict confidentiality of their personal details and information related to the study was maintained at all levels.

Outcome measures

Visual Analog Score (VAS) For Scoring of Pain: As per facial expression.

0 – No pain 1 – 3 = Mild pain 4 – 6 = Moderate to severe pain 7 – 9 = Very severe pain 10 = Worst pain

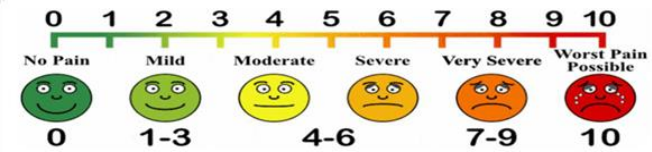

Figure1:

Total 50 patients having symptomatic gallbladder stones were selected for our study. These patients were randomly divided into two groups equally (Group A and Group B). In group A patients, we used 10 mm epigastric port and in group B patients we used 5 mm epigastric port. Rest 3 ports, one 10 mm umbilical port (for 30°telescope), one 5 mm port in right hypochondrium midclavicularline (working port), another 5 mm port in right lumbar region (for gallbladder fundus retraction) were same in both groups A and B.

Preoperative medications and care to all study patients were same. All surgeries were conducted under general anaesthesia. In all patients pneumoperitoneum was created by inserting Veress needle supraumbilically and using CO_2 gas. Technique of doing surgery was same in all patients. In group A patient after identification of one cystic artery and one cystic duct, 10 mm clip applicator was used to clip a cystic artery and a cystic duct via 10 mm epigastric port and gallbladder was also removed from same port. For epigastric and umbilical 10 mm port, sheath was closed first and then skin was sutured, while in both 5 mm port only skin was sutured. In group B patients dissection of calot's triangle was done as routine. After identifying one cystic duct and one cystic artery, we used 5 mm 30°telescope, which was introduced through 5 mm epigastric port for vision and 10 mm clip applicator was introduced via 10 mm umbilical port to clip a cystic artery and a cystic duct. Now in group B patients gallbladder was removed via umbilical port. Only for umbilical 10 mm port we closed

sheath first and then skin was sutured while in rest three 5 mm port (including epigastric) only skin was sutured. No patient was converted into open cholecystectomy. No port site local infiltration was done.

Same postoperative care was given to all patients including antibiotics (1.5 gm cefoperazone plus sulbactam), analgesics (Inj Diclofenac 75mg/2 ml stat whenever patient required), antiemetics, antacids, Intravenous fluids, wound management, initiation of oral diet, mobilization etc.

Postoperative pain over epigastric port site was measured at 1 hour, 3 hours, 6 hours, 12 hours, 18 hours, 24 hours, 2nd Day and at time of discharge using Visual Analog Scale (VAS) **Figure 1** and analysed statistically.

In postoperative period all patients were followed up at 3 weeks and 3 months for scar mark and port site incisional hernia. At 3 weeks and 3 months we recorded cosmetic results of epigastric port site in all 50 patients. We created a scoring system (ranging from 0 to 3) to record patients' responses, 0 - poor, unsatisfactory, discharge from wound, wound gap, scar infection / 1- keloid formation, hypertrophic scar formation/ 2- minimal scar formation/ 3- negligible scar formation. During followup, if port site hernia suspected then evaluated using radiological method like ultrasonography.

Data of both the groups were compared like demographic data (sex, age wise distributions), BMI, postoperative epigastric port site pain, analgesic dose requirement, operating time, total hospital stay, cosmetic outcomes, intra and postoperative complications like epigastric port site bleeding, intraperitoneal trocar injury, port site infection, epigastric port site hernia, and analysed statistically.

Results

- **Age and sex wise distribution of study population**

In our study maximum patients are seen in age group of 45 – 54 year in both study groups, 28% in group A and 36% in group B and 32% of sample size (n=50). (Table 1)

From Figure 2, female predominance is clearly visible in both study groups with 14 (56%) female patients in group A and 16 (64%) female patients in group B.

- **BMI of study population**

On basis of Table 2, there is no statistical significance seen in BMI comparison of both study groups (p-value is 0.48808). Table 3 shows full demographic data of our study population.

Post-Operative pain score for 10 mm (Group A/n=25) vs 5 mm (Group B/n=25) epigastric ports in laparoscopic cholecystectomy

Post-operative pain score was taken on basis of VAS (Visual Analog Scale Figure 1) in both study groups A and B at specific interval after laparoscopic cholecystectomy and statistical comparison of these pain scores was done and p-value was calculated as shown in Table 4.

Mean pain score for group A (10 mm epigastric port) is much more higher than group B (5 mm epigastric port) with significant p value is <0.05 at every specific interval, on post-operative day 1 of laparoscopic cholecystectomy. (Table 4)

On post-operative day 2 and at time of discharge, mean pain score for group A is still higher than group B with significant p-value <0.00001. (Table 4)

- **Analgesic dose requirement in both study groups**

Requirement of analgesic dose is higher in group A (Mean 215.98) than group B (Mean 189), which is

statistically significant with p-value 0.024045 (significant value <0.05) Table 5. This shows that by using 5 mm epigastric port in laparoscopic cholecystectomy we can reduce the analgesic burden and its side effects in patients.

- **Comparison of operating time in both groups**

Table 6 shows that, statistically significant difference was observed in duration of operative procedure in both groups. The mean of operating time in group A is 65.16 minutes and in group B is 58.52 minutes with p-value 0.016692 which is statistically significant (Significant p-value <0.05).

- **Hospital stay in both groups**

The mean of hospital stay after surgery was 2.2 days in group A and 2 days in group B, which was statistically not significant with p-value 0.063952. (Significant p-value <0.05) Table 7

- **Cosmetic results and incisional hernia of epigastric port site in both groups**

During follow-up period, cosmetic outcomes of both group were recorded and statistically analyzed at 3 weeks and 3 months after surgery. Statistically significant differences were observed on both occasion with p-value<0.05. Table 8.

Only one patient from group A had epigastric port site incisional hernia during follow up period and no incisional hernia was found in group B patients. Table 9.

- **Complications after surgery in both groups**

In group A (10 mm epigastric port) out of 25 patients 6 patients had epigastric port site bleeding while in group B (5 mm epigastric port) only one patient had epigastric port site bleeding, which is statistically significant with p value <0.05. Table 9

Out of total patients only one patient from group A (10mm port) had epigastric port site hernia after 3 months. No patients had intraperitoneal trocar injury and port sites infection. Table 9

Table1: Age Wise Distribution and mean age of patients in Group A and Group B

Age Group(Years)	Group A (n=25)(%)	Group B (n=25)(%)	Total (%)
16-24	2 (8%)	1 (4%)	3 (6%)
25-34	2 (8%)	1 (4%)	3 (6%)
35-44	6 (24%)	7 (28%)	13 (26%)
45-54	7 (28%)	9 (36%)	16 (32%)
55-64	4 (16%)	4 (16%)	8 (16%)
65-75	4 (16%)	3 (12%)	7 (14%)
Total	25 (100%)	25 (100%)	50 (100%)
Mean Age	48.02	48.78	

Figure 2: Bar Diagram Sex wise distribution of study population (n=50)

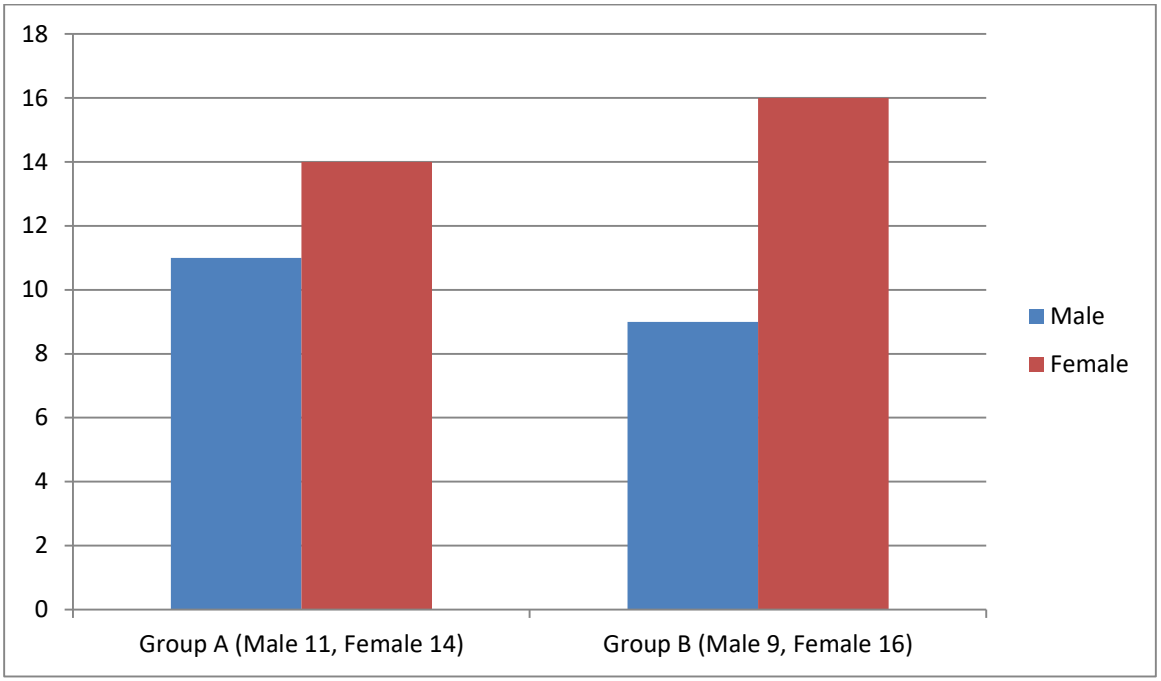

Table 2: BMI Calculation in both group of patients with p-value calculation (by student-t-test)

	Mean of BMI	SD	p-value (Significant level <0.05)
Group-A	25.32	2.602	0.48808
Group-B	25.295	2.279	

Table 3: Demographic data of our study sample(n=50)

Variables	Group-A(n=25)	Group-B(n=25)	All patients (n=50)
Age(years)	48.02 (Mean)	48.78 (Mean)	
Male	11	9	20
Female	14	16	30
BMI(Mean)	25.32 (Mean)	25.295 (Mean)	25.305 (Mean)

Table 4: Post-operative pain score in both groups

Duration Since Operation	Group-A(10mm) (Mean± SD)	Group-B (Mean± SD)	p-value (Significant level<0.05)
1 hour	5.68± 2.111	4.44 ± 2.041	0.021997
3 hours	4.44± 1.235	3.48± 1.473	0.009074
6 hours	4.24± 1.274	3.68± 1.009	0.048905
12 hours	4.20± 0.979	3.52± 0.699	0.004007
18 hours	3.88± 0.952	3.04± 1.038	0.002648
24 hours	3.52± 0.985	2.8± 1.019	0.008182

2nd Day	3.08± 1.093	1.48±1.099	<0.00001
At time of discharge	1.56± 0.697	0.56± 0.496	<0.00001

Table 5: Analgesic Dose in both groups

	Group– A (10 mm) (n=25)(Mean ± SD)	Group– B (5 mm) (n=25)(Mean ± SD)	p– value (Significant level<0.05)
Analgesic dose requirement (mg)(Mean± SD)	215.98 ± 44.069	189 ± 48	0.024045

Table 6: Operating time in both groups

	Group– A (10 mm) (n=25) (Mean ± SD)	Group– B (5 mm) (n=25)(Mean ± SD)	p– value (Significant level<0.05)
Duration (Minutes) (Mean± SD)	65.16 ± 10.608	58.52 ± 10.393	0.016692

Table 7: Hospital stay (in Days) in both groups

	Group – A (10 mm) (n=25)(Mean ± SD)	Group– B (5 mm) (n=25)(Mean ± SD)	p– value (Significant level<0.05)
Stay in Hospital(Days) (Mean± SD)	2.2 ± 0.489	2 ± 0.4	0.063952

Table 8: Cosmetic results of epigastric port site in both Group (Patients' Response Scoring System)

	Group– A (10 mm) (n=25)(Mean ± SD)	Group– B (5 mm) (n=25)(Mean ± SD)	p– value (Significant level<0.05)
3 Weeks	1.6± 0.748	2± 0.693	0.030306
3 Months	1.84± 0.543	2.32± 0.733	0.006531

Table 9: Post-surgical complications (Chi-Square test applied)

	Group– A (10 mm) (n =25)	Group– B (5 mm) (n =25)	p-value (Significant level<0.05)
Epigastric port site bleeding	6	1	0.041565
Port site infection	0	0	-
Intraperitoneal trocar injury	0	0	-
Epigastric port site hernia	1	0	-

Discussion

Total 50 patients having symptomatic gallbladder stones were selected for our study. These patients were randomly divided into two groups equally (Group A and Group B). In group A patients we used 10 mm epigastric port and in group B patients we used 5 mm epigastric port. Rest 3 ports, one 10 mm umbilical port (for telescope), one 5 mm port in right hypochondrium midclavicularline (working port), another 5 mm port in right lumbar region (for gallbladder fundus retraction)

were same in both groups A and B. The aim behind this study is to assess demographic data of gallbladder stone patients, postoperative port site pain, analgesic dose requirements, operative time, hospital stay, cosmetic outcomes, postoperative complications in both groups. In our study gallbladder disease (cholelithiasis) was maximally found in female patients (60%). Similar results were observed in other studies like Shakya et al[4] (75% female patients) and Siddiqui et al[2] (76% female patients). In our study maximum patients were seen in age group of 45-54 year. Mean age group was 48.02 years for group A and 48.78 years for group B. A study conducted by M Golderet al[5] showed that mean age for 10 mm epigastric port group was 58 years and for 5 mm epigastric port group was 52 years. The mean BMI in group A patients 25.32±2.602 and in group B patients 25.295±2.279 were found in our study, which is very similar to study conducted by Sarkar et al[7].In our study difference in the mean of postoperative pain score between two groups at specific interval is observed higher and is statistically also significant with p value <0.05. This shows that by just reducing size of epigastric port from 10 mm to 5 mm, we can reduce postoperative port site pain in patients. This result is statistically very similar with study conducted by Ramesh Ardhanariet al[6] and Sarkar S et al[7].Requirement of postoperative analgesic dose is higher in group A (with mean requirement 215.98±44.069 mg) than group B (with mean requirement 189±48 mg), which is statistically significant with p value 0.024045 (<0.05). Thus by reducing epigastric port size to 5 mm we can reduce postoperative analgesic burden and their side effects in patients. Similar result is observed in studies conducted by Ramesh Ardhanariet al[6] and Sarkar S et al[7].The mean operating time in group A was 65.16±10.608 minutes and in group B 58.52±10.393 minutes, which is statistically significant with p value 0.016692 (<0.05). The main reason behind lesser operating time in group B patients (5 mm epigastric port) is no use of reducer every time while changing the instruments in 5 mm working epigastric port and so no leakage of CO2 gas and no reduction in intra-abdominal pressure. A study conducted by Sarkar S et al[7] showing statistically significant (p value was 0.03) difference in operating time but no such time difference was observed in a study conducted by M Golder et al[5].In both groups mean duration of hospital stay was 2.2±0.489 days and 2±0.4 days in group A and B respectively. There was no statistical significance observed. This result is supported by a study conducted by M Golderet al[5] and Sarkar S et al[7].Cosmetic outcomes of 10 mm vs 5 mm epigastric port sites were recorded at 3 weeks and 3 months after operation and statistically analysed. Cosmetic results were more satisfactory for 5 mm port with statistically significant p value 0.006531 (<0.05). Intra and Postoperative complications like epigastric port site bleeding, port site infection, intraperitoneal trocar injury, epigastric port site hernia were compared between both the groups. In group A 6 patients had epigastric port site bleeding while in group B only one patient had bleed, reason behind is tear in falciform ligament while introducing 10 mm trocar in epigastric region, which is statistically significant with p value 0.041565. Out of 50 patients only one patient had epigastric port site hernia (after 3 months) which was belonging to group A (10 mm epigastric port).

Conclusion

By introducing 5 mm epigastric port instead of 10 mm in conventional four port laparoscopic cholecystectomy, we can make surgery more

satisfactory for patients in terms of less postoperative pain with low postoperative analgesic dose requirement and good cosmetic outcomes.

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