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Original Research Article

A STUDY OF LAPAROSCOPIC CHOLECYSTECTOMY IN PATIENTS WITH PREVIOUS ABDOMINAL SURGERY

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Abstract:

Introduction: Patients with previous abdominal surgery were earlier recommended not to undergo laparoscopy because of the increased risk of penetrating bowel injury. Keeping the above factors in mind the present study was undertaken and conducted in Surgery Department of Government Medical College and Rajindra Hospital, Patiala (punjab) to study the procedure in patients with previous abdominal surgery and evaluate its outcome.

Material and Methods: This prospective, parallel group study was conducted in the Department of General Surgery after approval from Institutional Ethics Committee. Patients of symptomatic gallstones willing to give written informed consent were enrolled in the study, documented by ultrasonography between the age group of 18 to 70 years and willing to give written informed consent for laparoscopic cholecystectomy were included in the study. Patients were divided into two group: Group A had patients who had no history of previous abdominal surgery and Group B had patients who had previously undergone abdominal surgery.

Results: A total of 255 patients with symptomatic gallstones were screened for the study and 195 patients completed the entire study (97 patients in Group A and 98 patients in Group B). Patients who had undergone a previous abdominal surgery had significantly higher adhesion, more conversion to open surgery, a greater duration of surgery and greater post operative pain as compared to patients who had no previous abdominal surgery when they underwent laparoscopic cholecystectomy.

Conclusion: Previous abdominal surgery does not represent a contraindication for laparoscopic cholecystectomy and patients following previous abdominal surgery although they have a longer duration of stay as compared to patients with no previous abdominal surgery.

Introduction

Cholelithiasis has plagued the mankind for over 2000 years [1]. The first successful open cholecystectomy for gall bladder stone was performed by Langenbuch in Berlin on 15th July 1882 [2]. As the risk of death or major complications from this was low hence, it was regarded as the "gold standard" for more than a century [3]. Another method to remove the gall bladder using laparoscopic technique was recently described and adopted by surgeons at an unprecedented rate [4]. The first laparoscopic cholecystectomy recorded in the medical literature was performed in 1987 by Mouret [5]. The technique was perfected by Dubios a year later [4], Perissat and Reddick [6]. In India, Udwadia performed the first laparoscopic cholecystectomy in 1989 [7].

Laparoscopic cholecystectomy provided all the advantages of cholecystectomy such as relief of symptoms and removal of gall bladder with the advantages of non-operative techniques associated with minimal pain and disability, low cost, outpatient or short hospital stay, much better cosmetic results and wide patient acceptance [8].

Laparoscopic cholecystectomy is now the gold standard for treatment of symptomatic cholelithiasis against which newer therapies should be compared [9, 10]. In September, 1992 a NIH consensus conference held in Bethesda (USA) concluded that laparoscopic cholecystectomy is the treatment of choice for gall bladder stones [11]. The mortality of laparoscopic cholecystectomy is as low as that previously reported for open cholecystectomy and ranges from 0% to 0.3% [12].

The advantages of laparoscopic cholecystectomy are so striking that it is impossible to justify performing an open procedure in cases, which can be done laparoscopically. The advantages of laparoscopic cholecystectomy over open cholecystectomy are shorter hospital stay, lesser pain, quicker return to routine activities, quicker return to work, economical benefits, better cosmetic scar, early ambulation with associated advantages like lower cardiopulmonary complications, lower incidence of deep vein thrombosis and laparoscopic cholecystectomy diminishes contact with the patient's blood and other body fluids [13].

Earlier patients with previous abdominal surgery were recommended not to undergo laparoscopy because of the increased risk of penetrating bowel injury caused by Veress needle or 1st trocar insertion through bowel adherent to the abdominal wall and laparoscopic adhesiolysis performed would be more time consuming and potentially more treacherous than open adhesiolysis. In laparoscopic cholecystectomy with previous abdominal operations, meticulous dissection with take down of abdominal wall adhesions, freeing of inter loop intestinal bands and scrupulous identification of important landmarks result in safe completion of the procedure.

30-50% of patients presenting for laparoscopic cholecystectomy have history of previous abdominal surgery and 60% of these require adhesiolysis. Patients with previous abdominal surgery pose two specific problems: Obtaining safe access to the abdominal cavity to achieve the pneumoperitomen and performing a safe adhesiolysis to gain adequate exposure to the operative field. Interference with access depends strongly on the location of the previous surgery [14].

Most vascular injuries are associated with a blind insertion technique of the first port, whereas more than half of all bowel injuries are associated with this technique. The risks for bowel injury or vascular injury are even higher if the needle is blindly placed through a previous incision. The Veress needle developed by Veress in 1938 for creation of pneumothorax for the

treatment of pulmonary tuberculosis is used to create the pneumoperitoneum [15].

Incidence of umbilical adhesions may be as high as 68% in patients with previous abdominal surgery especially in those where a midline scar extends to the umbilical region. Safer alternatives include placement of the needle and first trocar at a site far from the previous scar, this allows improved ability to see the abdominal cavity because vision is not obscured by adhesions and better assessment of location of remaining ports can be done and surgeons have appropriate working distance necessary to manipulate instruments. Palmer's point, located 3 cm inferior to the subcostal arch in the left mid clavicular line is a popular safe alternative [16]. Previous abdominal surgery is not a contraindication to attempting a procedure laparoscopically. Patients should be warned of the increased risk for bowel injury, the possible need for additional trocars and increased risk for conversion.

Hence keeping the above factors in mind and to have a data in North Indian set up, the present study was undertaken and conducted in Surgery Department of Government Medical College and Rajindra Hospital, Patiala (Punjab) to study the procedure in patients with previous abdominal surgery and evaluate its outcome.

Aims and Objectives

- To critically evaluate the procedure of laparoscopic cholecystectomy in patients with previous abdominal surgery.
- To assess the successful completion rate, operative time, advantages, the complication rate of laparoscopic cholecystectomy in patients with previous abdominal surgery.

Material and Methods

This prospective, parallel group study was conducted in the Department of General Surgery, Government Medical College and Rajindra Hospital, Patiala after approval from Institutional Ethics Committee. Patients of symptomatic gallstones willing to give written informed consent were enrolled in the study.

Patients suffering from symptomatic gallstones, documented by ultrasonography between the age group of 18 to 70 years and willing to give written informed consent and undergoing laparoscopic cholecystectomy were included in the study. Patients who were unfit for general anesthesia, suffering from bile duct disease, cirrhosis, portal hypertension, generalized peritonitis, splenomegaly, severe coagulapthy, carcinoma of gall bladder were excluded from the study. All patients with evidence of acute cholecystitis, pancreatitis were also excluded from the study. Patients who had undergone any upper abdominal surgery were also excluded from the study. All pregnant and lactating females were not enrolled in the study.

The patients were divided into two groups, Group A (n=100) included the patients who underwent laparoscopic cholecystectomy without any history of previous abdominal surgery. Group B (n=100) included the patients who had history of previous abdominal surgery.

All patients were worked up thoroughly starting from the outdoor patients department and were subjected to detailed history, general physical examination, abdominal examination and systemic examination. Patients were subjected to laboratory investigations that included hemoglobin (Hb), total leukocyte count (TLC), differential leukocyte count (DLC), bleeding time (BT), clotting time (CT), fasting blood sugar (FBS), blood urea, serum creatinine, electrocardiography (ECG), liver function test (LFT). Patients were selected only if the biochemical tests were within normal range.

Patients then underwent an pre-operative ultrasonography with emphasis on gall bladder size, wall thickness, presence of single or multiple stone in the gall bladder; assessment of common bile duct (for size

and evidence of stone), condition of biliary passage, pancreas and liver.

Patients were allowed to take meals till midnight then nil per oral (NPO) till operation. Standard premedication was given half-hour before operation and all patients were subjected to standard general anesthesia with intubation and controlled ventilation by the anesthetic team.

Electronic carbondioxide insufflators, high intensity halogen light source, high-resolution single chip camera, video monitor compatible with camera, fiber optic light cable, 10 mm telescope 0°, monoploar cautery were used for laparoscopic cholecystectomy. Laparoscopic instruments were sterilized by using formaldehyde and subsequently by dipping all instruments and tubing in a cidex tray for 20-25 minutes.

Procedure

All patients were put supine on the operating table (The North American Method), pneumoperiotnium was created using Veress needle with closed method. Carbon dioxide insufflations were performed using automatic insufflators set at 1 liter/minute initially and then insufflations rate were increased so that maximum pressure of 12 mmHg was obtained. The first 10mm port was inserted through the umbilical site incision using a rotatory movement, the next 10mm port was inserted in the epigastrium just below the xiphisternum under direct vision, the third (5mm) port was inserted about 2.5-3 cm below the right costal margin in the midclavicular line and the forth 5-mm port was inserted in right anterior axillary line at the level of umbilicus under direct vision. Adhesions to the underside of the liver and gall bladder were carefully taken down beginning near the fundus and preceding downwards the neck. Adhesions were retracted inferiorly with grasper to expose plane of division. If the gall bladder was distended as in mucocele, needle aspiration decompression was done under visual control. This was followed by Calot's triangle dissection.

The dissection began directly adjacent to the gall bladder, took down any adhesions to the base of the gall bladder. Dissection in Calot's triangle was started only after the gallbladder cystic duct junction was identified. The peritoneal covering overlying the triangle of Calot's was gently dissected; Inferiolateral blunt dissection was accomplished with anteromedial infundibular traction. Once the peritoneal covering was dissected off the Calot's triangle, the cystic duct and cystic artery were identified and dissected individually using blunt dissection. Cystic duct was identified at the junction with the gall bladder (safety zone) it was not always necessary to identify and dissect out the cystic common duct junction (Danger Zone). No clip was placed on any ductal structure until, the transition between cystic duct and gallbladder infundibulum was not clearly visualized. Cystic artery was identified along with its anterior and posterior branches within the Calot triangle avoiding any potential avulsion of the cystic artery off the right hepatic artery by traction or by traumatic dissection. Both cystic duct and artery were clipped, two clips on cystic duct side and one clip to the gallbladder side. It was desirable to divide the artery before the duct.

The gall bladder was detached from liver bed taking care to stay away from the portahepatis and liver bed and to avoid perforation of the gallbladder with monopolar cautery hook, traction and counter traction with right lateral or left medial twist facilitated the dissection. Any inadvertent spillage of bile or stone from the gallbladder during the procedure was controlled by reapplying the grasping clamp. Spilled infected fluid of gallbladder was sucked out. Spilled stones were removed immediate or were placed in an endobag and removed later. Prior to complete detachment of the gallbladder the liver bed was re-inspected for adequate homeostasis or bile leak the cystic duct remnant and cystic artery were examined once again to ensure that

previously placed clips or sutures remain secure. After ensuring complete homeostasis, the remainder of the separation was carried out and gallbladder was extracted. Extraction of the gallbladder was through the epigastric port. The gallbladder was maneuvered into position just below the liver. The gallbladder was then opened externally over the mop to prevent any spillage into the port site and the bile emptied by applying the suction; stones were extracted using sponge holding forceps. Large stones were crushed or broken up & removed piecemeal. A laparoscopic view of the gallbladder was maintained through the laparoscope in the abdomen to make sure that there were no signs of spillage or rupture. If required exit port was enlarged. After gallbladder was extracted, irrigation and suction of the gallbladder bed, Morrison's pouch, and paracolic gutter and perihepatic areas with copious amount of saline was done. The saline was suctioned out. Homeostasis was ensured in the gallbladder bed, porta hepatis, and elsewhere in the abdomen. Closed suction drain was placed through lateral axillary port. The trocars were removed under direct visual control and at last and port site closure was done by applying the sutures.

Intraoperative Analysis

During the procedure careful note was made of, operative time, operating technique. The intraoperative difficulties and complications were analyzed as: adhesions, impacted stones, gall bladder perforation, common bile duct injury, thermal injury, uncontrolled bleeding, technical problem, and conversion

Post operative course

Postoperative note was made for duration of drain, duration of hospital stay, time of oral intake and time to return to full activity. Post-operative analgesia was done with non-steroidal anti-inflammatory drug (Diclofenac) in the recovery room and any additional dose if necessary. The degree of postoperative pain was assessed using a vertical 10cm visual analogue scale (VAS) in which 0 represented no pain and 10 represented the worst pain imaginable at six time intervals during the first 48 hours, the site of pain was also recorded as right shoulder tip, left shoulder tip, or generalized abdominal pain at the same time intervals.

For, post-operative nausea and vomiting, patients received ondansetron and ranitidine and notes were made of vomiting and anti emetic requirement. Oral fluids were allowed after 6-10 hours, depending on the condition of patient. Patient was made ambulatory in 8-12 hours after surgery. The next morning patients was allowed light breakfast and drain was removed based on the quantity and content of secretions.

Discharge

The patients were discharged if they had adequate pain control, were self ambulatory, and had postoperative voiding of urine and oral intake without vomiting. Patients were followed up at 7 days when stitches were removed. Note was made of any wound infection or any other complaint. Patients were again followed up at 4 weeks, note were made of any persistent pain, jaundice, or any other complaint. Patients were enquired about time taken to return to routine activity, i.e. the duration of convalescence and overall status after surgery. Patients were followed up at 3 months, note was made for any other complaint and were asked of symptomatic improvement.

Statistical analysis

The data was presented as mean ± standard deviation (Mean ± SD). Results were analyzed using non parametric tests (Chi-Square Test, Wilcoxon Sign Ranked Test and Mann Whitney U Test) and parametric tests (two tailed student t-test). A $p<0.05$ was considered statistically significant.

Nominal variables were compared with Chi-square analysis. The Student-t test was used for comparison of group means for normally distributed data and the Mann-Whitney U test/ Wilcoxon Sign Rank Test was used for non-normally distributed data.

Results

A total of 255 patients with symptomatic gallstones were screened for the study. Out of the 255 screened patients, 223 were eligible for the study. All the eligible patients were invited to participate in the study. 11 patients in Group A and 12 patients in Group B were excluded from the study due to the withdrawal of their written informed consent for participation in the study. 5 patients did not complete of follow-up and hence, were excluded from the study. 195 patients completed the entire study (97 patients in Group A and 98 patients in Group B). Both the groups had comparable baseline characteristics (Table 1). In this study, pain upper abdomen was the presenting symptom in 192 patients (98%). The other symptoms were dyspepsia in 190 patients (97%) and vomiting in 117 patients (60%).

A total of 98 patients enrolled in Group B had undergone a previous abdominal surgery, 90 patients underwent a lower abdominal surgery with majority being surgery for gynecological procedures. A total of 43 patients had a previous caesarean section done, followed by 26 patient had previously undergone tubectomy and 13 hysterectomy.

All the patients underwent an abdominal ultrasound the results of which are tabulated in Table 2. 120 patients were having multiple stones in gall bladder on USG, 75 patients were having single stone in gall bladder. Patients in Group A had a bigger size of stone and greater diameter of common bile duct but it was not statistically significant (Table 2).

Procedure

In the present study, closed method of creating pneumoperitoneum was used all the patients in group A veress needle was put in infraumbilical region, whereas infraumblical region was used in only 31 patients in group B. Supraumbilical region was used in 58 cases, Palmer' point space was used in 9 cases in Group B. A significantly ($p<0.05$) higher number of patients in Group B had conversion to open surgery (3 vs. 11) and were excluded from the statistical analysis. A significantly ($p<0.05$) higher number of patients in Group B had adhesions as compared to patients in Group A (30 vs. 6) (Table 3). The mean duration of surgery was significantly ($p<0.05$) higher in group B, with significantly ($p<0.05$) less time taken in patients with previous lower abdominal surgery as compared to previous upper abdominal surgery (50 ± 10.2 vs. 76.2 ± 13.2 minutes) in Group B. Oral intake was started at an earlier time course in Group A but was not statistically significant. Similarly, the drain removal was at an earlier point of time and hospital stay was less in Group A but was not statistically significant.

Peroperative Complications

There was cystic artery injury in 7 patients, 3 in group A and 4 in group B, which was minor and controlled in 6 patients but in one patient in group A it was not controlled even after various methods to control the bleeding so it was converted to open surgery. Gall bladder bed bleeding was noted in 11 patients, 8 in group A and 3 in group B, which was controlled by use of diathermy. Rupture of the gall bladder occurred in 60 patients with spillage of bile and stones. Further spillage was minimized by closing the defect in gall bladder after retrieving the stones; extensive peritoneal lavage was done with normal saline.

Postoperative Complaints

The post operative complaints are tabulated in table 4, in both groups patients complained of pain, nausea, vomiting, fever, paralytic ileus, and chest infections. There was a significantly ($p<0.05$) higher number of patients in Group B who complaint of postoperative pain on the second day.

In the present study of 195 cases of gall bladder stone disease, there was no mortality. The mean duration of return to work in group A was 11.9 ± 2.40 as

compared to 12.1 ± 2.42 days in group B and was not statistically significant.

Discussion

The present study was undertaken and conducted in the surgery department of Government Medical College and Rajindra Hospital Patiala (Punjab), to evaluate the procedure of laparoscopic cholecystectomy in patients having history of previous abdominal surgery and to assess the complications, postoperative hospital stay, conversion rate and successful completion of laparoscopic cholecystectomy in patients having history of previous abdominal surgery.

The results of our study demonstrated that patients who had undergone a previous abdominal surgery had significantly higher adhesion, more conversion to open surgery, a greater duration of surgery and greater post operative pain as compared to patients who had no previous abdominal surgery when they underwent laparoscopic cholecystectomy for gall bladder stones.

Laparoscopic cholecystectomy is replacing open surgery as the procedure of choice for the operative management of symptomatic gallbladder disease [17]. An accepted relative contraindication to the performance of laparoscopic cholecystectomy is a history of prior intra-abdominal or abdominal wall surgery [18]. Pellegrini have stated that previous abdominal surgery is no longer a contraindication for laparoscopic cholecystectomy [19].

This study demonstrates that laparoscopic cholecystectomy can be successfully performed in patients who have had prior abdominal surgery. The mean age of the patients in our study was 45.9 years which is more or less similar to studies reported earlier where the mean age was between 43 to 47 years [20, 21, 22]. The preoperative assessment of the gall bladder and CBD by liver function tests and USG before laparoscopic cholecystectomy removes the need for routine operative cholangiography [23].

Semm published statistics of the Federal Republic of Germany of laparoscopic gynecological from 1983-85 and found that complications were generally due to lack of experience of the surgeons and not to previous surgery [24, 25].

In present study, bleeding was observed in 11 patients in group A and 7 patients in group B, but in most cases, it was easily controlled. The basic principles recommended to control bleeding are: No panic use of cautery, compression by gall bladder, sponge piece or by roll gauze for 5 min., irrigation and aspiration of the bleeding area, then grasp the bleeding vessel, if bleeding site was not clearly identified after these maneuvers then convert to open [7]. Most of the series reported lesser bleeding like our study [20, 26].

In our study the rupture of gall bladder was reported between 28-32% which is quiet similar to report in previous studies where the incidence was found between 12-40 % [27, 28].

Studies done earlier have reported less than 1% conversion of laparoscopic cholecystectomies in patients with previous abdominal surgery [29] the reason reported for conversion was adhesions due to previous surgery, whereas other studies have reported a conversion to the rate of 30-71% [30, 31]. The results are quite similar in our study where the patients in group who had undergone previous abdominal surgery were around 30%.

The conversion rate in our study was higher in group who had undergone previous abdominal surgery. The conversion rate was quite similar and has been reported at around the rate of 4 to 12 % [31-34]. It has been suggested that majority of patients previously operated can safely undergo a laparoscopic cholecystectomy, although the presence of adhesions frequently

necessitates conversion to an open approach [33, 35, 36].

The duration of surgery was significantly greater in patients who had undergone previous surgery and results are quite similar to that reported in previous studies [31, 37].

To conclude it can be stated that previous abdominal surgery, even in the upper abdomen is not a contraindication to safe laparoscopic cholecystectomy. However previous abdominal surgery is associated with an increased need for adhesiolysis, a higher conversion rate to open, a prolonged operative time and a longer postoperative hospital stay.

In the end, it is concluded that previous abdominal surgery does not represent a contraindication for laparoscopic cholecystectomy and patients following previous abdominal surgery will profit from laparoscopic procedure to the same extent as already proven for patients undergoing laparoscopic cholecystectomy without history of previous abdominal surgery.

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Table 1. Baseline characteristics in both groups

Characteristics	Group A (n=97)	Group B (n=98)	p value
Age (years) (Mean ± SD)	45.9 ± 12.8	45.7 ± 11.3	0.91*
Sex (Male: Female)	15:82	8:90	0.13#
Weight(kg) (Mean ± SD)	64.9 ± 9.94	66.4 ± 7.45	0.23*
Height (m) (Mean ± SD)	1.57 ± 0.06	1.57 ± 0.05	0.44*
BMI (Mean ± SD)	28.2 ± 3.28	28.8 ± 3.34	0.16*
Symptoms – Pain (n)	94	98	0.12#
Symptoms – Vomiting (n)	55	62	0.38#
Symptoms –Dyspepsia (n)	95	95	-
*using student 't' test #using Chi-square test			
BMI: Body Mass Index; SD: Standard deviation			

Table 2. Abdominal ultrasound finding in both groups

Ultrasound findings	Group A (n=97)	Group B (n=98)	p value
No. of stones (Single: Multiple)	39:58	36:62	0.73#
Size of stones (mm) (Mean ± SD)	10.3 ± 18.5	7.9 ± 5.21	0.23*
GB wall thickness (cm) (Mean ± SD)	2.5 ± 0.37	2.5 ± 0.42	0.15*
CBD diameter (mm) (Mean ± SD)	3.8 ± 1.31	3.5 ± 0.92	0.06*
*using student 't' test #using Chi-square test			
GB: Gall Bladder; CBD: Common Bile Duct; SD: Standard deviation			

Table 3. Operative finding in both groups

Characteristics	Group A (n=97)	Group B (n=98)	p value
Adhesions	6	30	<0.001#
Cases Converted	3	11	0.05#
Duration of Surgery (min) (Mean ± SD)	41.9 ± 17.4	62.4 ± 12.9	<0.001*
Oral intake (hrs) (Mean ± SD)	13.9 ± 12	14.5 ± 13.8	0.73*
Removal of Drain (days) (Mean ± SD)	2.9 ± 0.91	3.2 ± 1.05	0.02*
Hospital Stay (days) (Mean ± SD)	2.1 ± 1.27	2.3 ± 1.14	0.41*
*using student 't' test #using Chi-square test			

Table 4. Postoperative complaints in both groups

Complaint	Group A (n=97)	Group B (n=98)	p value
Pain (Day 1)	94	89	-
Pain (Day 2)	21	47	<0.001#
Nausea	24	33	0.13#
Vomiting	6	5	0.83#
Fever	2	0	0.50#
Paralytic ileus	1	2	0.96#
Chest infection	2	2	0.97#
*using student 't' test #using Chi-square test			