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Retrospective analysis of complications in 3600 patients of laparoscopic cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy results in specific complications which occur frequently as compared to open cholecystectomy. Several aspects of these complications and their treatment modalities were analyzed.

Methods: 3600 cases of laparoscopic cholecystectomy performed by a single surgeon at various private hospitals in Jammu (Jammu and Kashmir), India during the period of 18 years from March 2002 to March 2020 were analyzed for the complications and their management.

Results: Complications of laparoscopic cholecystectomy occurred in 14.5% of the patients. The most common complication was haemorrhage. Conversion to open cholecystectomy was necessary in 41 (1.13%) patients due to obscure anatomy as a result of adhesions and acute inflammation. In the study, 6 deaths (0.16%) were recorded.

Conclusions: Laparoscopic surgeon should remain highly vigilant to detect major complications like injury to small gut at the time of entry into the peritoneal cavity or bile duct injury during laparoscopic cholecystectomy at an earliest and should timely manage such cases to save the life of the patient.

Keywords: Bile duct, Cholelithiasis, Choleperitonitis, Haemorrhage, Laparoscopic cholecystectomy

INTRODUCTION

During the past 2 decades, laparoscopic cholecystectomy has become the procedure of choice in the surgical treatment of gall bladder stone disease and cholecystitis. Though laparoscopic cholecystectomy has many advantages over open cholecystectomy such as minimal trauma, less pain, shorter hospital stay, faster recovery, early resumption of work and satisfactory cosmetic outcome, yet this operative technique has introduced a new spectrum of intraoperative and postoperative complications like bleeding from the trocar sites and vascular injuries, gall bladder perforation and spillage of

gall stones, bile duct injury and biliary leakage, port-site infection and iatrogenic bowel injuries. The frequency of complications associated with laparoscopic cholecystectomy varies from 0.5% to 6%. Minor complications are usually treated conservatively. Major complications like bowel, biliary and vascular injuries are life threatening and increase mortality rate, therefore creating the need for conversion to open surgical approach in order to treat them. Male gender, old age, presence of systemic inflammatory response syndrome manifested by elevated white blood cell count, acute inflammation of the gallbladder and preoperative ultrasonographic finding of increased thickness of the gallbladder wall or presence

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of gallbladder empyema and impacted stone at gallbladder neck, are the factors that increase risk for development of complications of laparoscopic cholecystectomy and the necessity of conversion to open cholecystectomy.³

Acute cholecystitis is the most frequent situation carrying an increased operative risk because of pericholecystits which obscures the anatomy and increases the difficulty in identifying the cystic duct and CBD and loss of the cleavage plane in the gallbladder bed due to acute inflammation makes it easy to penetrate the liver parenchyma during dissection of the gallbladder, thus creating the possibility of haemorrhage and postoperative bile leakage and choleperitoneum. Other situations associated with increased risk of laparoscopic cholecystectomy are shrunken fibrotic gallbladder, cirrhosis of liver and obesity. Complications during laparoscopic cholecystectomy can be prevented by careful selection of the patient, precise operative technique, clear visualization of anatomical landmarks and careful dissection of tissues. Thus, the present study has been carried out to analyze the rate of complications of laparoscopic cholecystectomy, factors responsible for these complications and proper methods to treat them.

METHODS

The study is a retrospective review of 3600 patients of consecutive laparoscopic cholecystectomy performed by a single surgeon, Dr. Rajive Gupta, the corresponding author at various private hospitals in Jammu (Jammu and Kashmir), India over a period of 18 years from March 2002 to March 2020.

Inclusion criteria

Both acute as well as chronic patients of sonographically proved cholelithiasis were part of the study. Also cases of acalculous cholecystitis, gallbladder polyps and stones in gallbladder remnant were included in the study.

Exclusion criteria

Patients who were not fit for general anesthesia (ASA-grade IV) and patients with known coagulation disorders, acute pancreatitis, surgical jaundice associated with choledocholithiasis and suspected or proven malignant gall bladder were excluded.

The list of different hospitals along with number of laparoscopic cholecystectomies performed there is given in Table 1.

Preoperative assessment

The patients in the study were initially evaluated by thorough history and clinical examination. They were subjected to the routine investigations for general anesthesia. Informed written consent was taken from all the patients and they were admitted for surgery on the same day. All patients were asked to empty urinary bladder before shifting to OT and were operated under general anesthesia by the same surgical team.

Table 1: Hospital wise distribution of cases.

Name of the hospital	Number of cases (%)
Bee Enn General Hospital, Talab Tillo	900 (25.00)
Kalindi Nursing Home, Subash Nagar	650 (18.05)
Care & Cure Hospital, Trikuta Nagar	550 (15.27)
Maxxlyfe Hospital, Bathindi	423 (11.75)
Ganeshdaya Nursing home, Talab Tillo	400 (11.11)
Lochan Nursing Home, Trikuta Nagar	200 (5.55)
Goel Hospital, Canal Road	100 (2.77)
AV Nursing Home, Channi Himmat	90 (2.50)
Vini Hospital, Janipur	80 (2.22)
Mediaids Nursing Home, Channi Himmat	70 (1.94)
Medicare Nursing Home, Gandhi Nagar	40 (1.11)
JK Medicity, Narwal Bypass	30 (0.83)
Kapoor Nursing Home, Bakshi Nagar	15 (0.41)
72 Beats Hospital, Bypass Channi Himmat	14 (0.38)
Maharishi Dayanand Hospital, Rehari Chungi	10 (0.27)
SHS Memorial Hospital, Rehari Chungi	08 (0.22)
Shree Om Hospital, Bari Brahmana	08 (0.22)
SDDM Hospital, Channi Himmat	06 (0.16)
Lifeline Hospital, Last Morh Gandhi Nagar	03 (0.08)
Baba Nanak Medicity, Gadigarh	03 (0.08)

Operative technique

The technique used for laparoscopic cholecystectomy in the study was 3 port procedure, though the standard technique is 4 port keyhole surgery as the operating surgeon is expert in conducting laparoscopic cholecystectomy by 3 key holes only. The placement of primary 10 mm trocar was by blind method through an incision within the umbilicus, though many surgeons make either supra or infra-umbilical incision. Second 5 or 10 mm epigastric and third 5 mm subcostal trocars were placed under direct vision after creating carbon dioxide pneumo-peritoneum. Operating table was tilted 15 degree reverse Trendelenburg position and 15 degree to the left. The surgeon and camera man stood on the patient's left and monitor was positioned towards the patient's right side. The operating telescope (zero degree Karl Storz) was placed through the umbilical port and peritoneoscopy performed with the intra-abdominal pressure maintained at 14 mm. A toothed grasper was then inserted through the third port to hold the gall bladder at infundibulum and dissection started high in the neck of gallbladder by

passing a Maryland dissecting forceps through the epigastric port. Special maneuvering of the grasping forceps was done, in which the shaft of the forceps was moved in opposite direction to the movement of the jaw to retract the liver. This maneuver practically achieved similar exposure in the region of Calot's triangle as is done by fundal grasper in 4 port technique. The cystic artery and cystic duct were defined and separated. Cystic artery was coagulated and cut by using bipolar diathermy and cystic duct was ligated by No. 0 silk extracorporeal Roeder's knot using a knot pusher or clipped using a 5 or 10 mm clip applicator and cut (Figure 1).

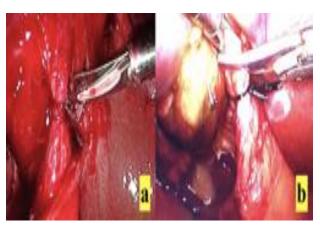


Figure 1 (a, b): Cystic duct being ligated and cut.

The gallbladder was dissected off the liver bed using electrocautery and finally extracted through the epigastric port along with calculi. The skin incision at umbilicus was closed by subcutaneous 00 vicryl suture, whereas the other two ports didn't require stitches and were simply covered by the pressure gauge dressings. Record of all the patients was evaluated for the presence of potential risk factors that could predict the development of complications such as age, gender, white blood cell count, preoperative gallbladder ultrasonographic findings and pathohistological analysis of the surgically removed gallbladders. All the complications of laparoscopic cholecystectomy encountered in the study and methods of their management were analyzed and compared with various studies including the morbidity and mortality rates.

Ethical approval

Each subject signed the acceptance of the study protocol, in which the Ethical Principles for Medical Research Involving Human Subjects were clearly stated.

Statistical analysis

For statistical analysis, descriptive statistics was used and data was analyzed using SPSS software version 21.0. To

evaluate the association between variables, chi square and the Fisher's exact test were used.

RESULTS

Among 3600 cases who underwent laparoscopic cholecystectomy, 590 (16.39%) were male patients and 3010 (83.61%) were female. The age group ranged between 4-91 years (Table 2) and most of them (2700 cases, 75%) were between age of 30 to 50 years and 208 (5.77%) patients were aged over 60 years.

Table 2: Age group distribution (n=3600).

Age group (years)	Total	Percentage (%)
4-10	12	0.33
11-20	40	1.11
21-30	250	6.94
31-40	1320	36.66
41-50	1130	31.38
51-60	640	17.77
61-70	130	3.61
71-80	52	1.44
81-91	26	0.72

The operative diagnoses are given in Table 3. Most common operative diagnosis was chronic calculous cholecystitis (2785 cases, 77.36%).

Table 3: List of operative diagnoses.

Operative diagnosis	No. of cases (%)
Chronic calculous cholecystitis	2785 (77.36)
Acute cholecystitis	397 (11.07)
Gallbladder mucocele	347 (9.63)
Sclero-atrophic cholecystitis	28 (0.77)
Acalculous cholecystitis	20 (0.55)
Gallbladder polyps	18 (0.50)
Gallstones in a gallbladder remnant	05 (0.13)
Total	3600

Intraoperative and postoperative complications

There occurred 522 (14.5%) complications of laparoscopic cholecystectomy in this study as shown in Table 4 and complication rate was more in male patients.

Most common complication in the study was hemorrhage. Table 5 shows the various causes of hemorrhage and its management.

Laparoscopic cholecystectomy was performed in already scarred abdomen due to previous surgery in 305 (8.47%) patients as shown in Table 6.

Table 4: List of complications of laparoscopic cholecystectomy (n=522).

Complication	Total no.	Percentage	
Haemorrhage	197	5.47	
Iatrogenic perforation of gallbladder	192	5.33	
Port site infection	68	1.88	
Bowel injury	15	0.41	
Incisional/port site hernia	14	0.38	
Injuries to CBD and choleperitoneum	13	0.36	
Postoperative pancreatitis	9	0.25	
Postoperative biliary stricture	6	0.16	
Pelvic choleperitoneum	4	0.11	
Colon injury	2	0.05	
Stomach injury	1	0.02	
Lost outer sleeve of veress needle	1	0.02	

Table 5: Analysis of causes of haemorrhage, its management and result: 197 cases (5.47%).

Cause of haemorrhage	Total	Management	Result	Conversion
From gallbladder bed	62	Pressure packing/haemostat patch	62	0
From cystic artery	54	Clipping the artery	52	2
From trocar injury to liver	26	Pressure and coagulation	26	0
Port site bleeding	24	Port suturing/Pressure packing	14/10	0
Hematoma of abdominal wall	16	Observation	16	0
From greater omentum	10	Diathermic coagulation/silk ligature	7/3	
From ligaments of liver	3	Diathermic coagulation	3	0
From hepatic artery	1	Open surgery		1
Concealed hemorrhage	1		•	

Table 6: Causes of scarred abdomen in patients who underwent laparoscopic cholecystectomy.

Previous surgery	Incision/scar	Incidence
LSCS	Lower midline/pfannenstiel	126
Abdominal hysterectomy	Lower midline/pfannenstiel 61	
Appendectomy	Right lower paramedian/grid iron 40	
DU perforation	Upper paramedian	14
Pyelolithotomy/ureterolithotomy	Oblique lumbar incision	13
Inguinal hernia	Oblique inguinal incision	11
Cystolithotomy	Transverse suprapubic incision	9
Retropubic prostatectomy	Pfannenstiel	8
Abdominal wall hernia repair	Transverse supra-umbilical/umbilical	6
Right nephrectomy	Right oblique lumbar incision	5
Enteric perforation	Mid paramedian	4
Exploratory laparotomy for stab abdomen	Mid paramedian	3
Hydatid liver cyst operation	Right subcostal	2
Splenectomy	Left upper paramedian/T incision	2
Gastrectomy	Right upper paramedian	1

Out of these 305 patients with previous history of abdominal surgery, only 32 patients had abdominal scars around umbilicus, thus hindering the primary port placement. Peritoneal adhesions in the previously scarred abdomen lead to conversion in only 8 patients out of these 32 patients and in rest 24 such patients, safe entry into the peritoneum was achieved through the Palmer's point situated in left midclavicular line, 2-3 cm below the

costal margin to create pneumoperitoneum because in the left upper quadrant, adhesions are least likely to be found following previous surgery except for splenectomy (Figure 2).

Conversion to open surgery was necessary in 41 cases (1.13%) and they were more common in males (30 males,

73.17%) as compared to females (11 females, 26.83%). The causes for conversion are shown in Table 7.



Figure 2: Palmer's point.

Table 7: Causes of conversion to open surgery.

Causes of conversion	Total No. (%)
Iatrogenic small gut injury	15 (0.41)
Scarred abdomen	8 (0.22)
Difficult access to Calot's triangle and obscure anatomy	4 (0.11)
Cholecystocolonic fistula	4 (0.11)
Hemorrhage from vascular injury (Cystic artery and hepatic artery)	3 (0.08)
Gallbladder empyema and highly thickened GB wall	2 (0.05)
Transection of the common bile duct	2 (0.05)
Colon injury	2 (0.05)
Gastric injury	1 (0.02)

Mortality

Total mortality in the study was 6 (0.16%) patients as given in Table 8.

Table 8: Causes of mortality in laparoscopic cholecystectomy.

Cause of mortality	Number of patients
Iatrogenic small gut injury	2
Postoperative pancreatitis	1
Gastric injury	1
Anesthesia complication	1
Concealed hemorrhage	1

DISCUSSION

Laparoscopic cholecystectomy is the preferred method for the treatment of symptomatic cholelithiasis. Though laparoscopic cholecystectomy has many advantages over the open cholecystectomy, yet numerous studies have shown that laparoscopic cholecystectomy is associated with a higher frequency of complications as compared to the open cholecystectomy such as vascular and visceral injuries with fatal outcomes.^{1,2} Contrary to initial reports of an increased complication rate, recent data shows that laparoscopic cholecystectomy entails lower morbidity and mortality rates than open operation.³

The creation of pneumoperitoneum itself has a mortality risk of up to 0.2%. The incidence of injuries from trocars or veress needles is also up to 0.2%. Most of the recent articles show evidence that the veress needle has a higher risk of causing an injury than the open technique.⁴ Yardel et al report in their study, which included 1,500 patients who had undergone laparoscopic cholecystectomy, a 14% rate of injury with the needle technique versus 0.9% with the open technique.⁵ In present study, closed technique with direct insertion of blunt trocar was used for creation of pneumoperitoneum, though veress needle was used in few patients.

The most common are vascular injuries and they are the leading cause of mortality and morbidity in laparoscopic surgery.6 Although major injuries to the great blood vessels like the aorta, inferior vena cava or iliac artery are rare, they are associated with high mortality rate.⁷ Marakis et al reported vascular injuries in 15 (1.22%) out of 1,225 and Kaushik reported 6 (0.49%) out of 1,233 laparoscopic cholecystectomies.^{8,9} In present study also, haemorrhage was the most common complication and occurred in 197 (5.47%) patients and was caused mainly by bleeding from the gallbladder bed in the liver and haemostasis was mainly achieved by conservative means such as placing a wet adequate sized gauze piece over the bleeding site and applying pressure for 5-8 minutes, by using bipolar diathermy and by placing haemostatic patch of Spongston (absorbable gelatin sponge) or oxidized regenerated cellulose (surgicel) over the bleeding site. In the literature, haemorrhage from an arterial injury is a usual reason for conversion, but in our study, haemostasis was achieved almost exclusively by laparoscopic means by rapid grasping of the injured vessel and then clipping the vessel except in 2 patients in whom the cystic artery was too short (or sectioned near its origin) and in 1 patient of hepatic artery bleed where conversion was essential to arrest the bleeding.

Perforation of a gallbladder with spillage of gallstones into the peritoneal cavity is a frequent complication of laparoscopic cholecystectomy, especially when associated with acute cholecystitis and its incidence is estimated between 10% and 30%. ¹⁰ In present study, there were 192 (5.33%) iatrogenic perforations of the gallbladder with spillage of gallbladder stones. Horton et al reported that 5% of their patients of spilt gallstones showed symptoms. ¹¹ Risk factors for the occurrence of symptoms after spillage are the chemical composition of spilled stone and the presence of acute gall bladder

inflammation or infected bile. Pigmented stones usually promote the genesis of abscesses more than the other types do.¹² Studies show that the most common secondary complication due to spilled gallstones is intraabdominal abscess formation followed by abdominal wall infection or permanent sinus and fistulas.¹³ In present study, every spilled gallstone was removed under direct vision and the area was thoroughly irrigated with normal saline and betadine in all cases of gallbladder perforation and there was no case of intra-abdominal abscess, though in 5 patients, epigastric port infection and discharging sinus developed due to gallstones spilled in the tract while extracting the gall bladder and retained in the port tract. Later, tract exploration under local anaesthesia revealed the stones that were removed and infection settled with antibiotics and repeated antiseptic dressings.

Results from open cholecystectomy indicate a CBD injury incidence of 0.12%-0.25%. ¹⁴ After the introduction of laparoscopic cholecystectomy, early series reported a high increase of CBD injury, up to 2% and 4% in acute cholecystitis. This was interpreted as an effect of the "learning curve". 15 Morgenstern et al in their report found no difference in the incidence of CBD injury between the first and the second series of 1,500 laparoscopic cholecystectomy. 16 Nuzzo et al analyzed complications of 57,317 laparoscopic cholecystectomies done in 184 hospitals in Italy in the time period from 1998 to 2000 and reported 235 (0.41%) injuries of the common bile duct.¹⁷ Tantia et al analyzed data from 13,305 laparoscopic cholecystectomies that were done over a period of 13 years and found that 52 (0.39%) cases had a transection of the common bile duct.¹⁸ Generally, the application of clips blindly or the blind use of the electrocautery hook can cause severe injury to the bile duct. 19 Congenital biliary anomalies are also an important cause for bile duct injuries during laparoscopic cholecystectomy. Bile leaks might occur due to clip displacement, necrosis of the cystic duct due to the clip or aberrant ducts.²⁰ Detachment of the gallbladder may open any accessory bile duct present in the gallbladder bed, post mortem studies demonstrate their presence in 3-5% of individuals.²¹ In present study, accessory bile ducts were noted in the gallbladder bed in 2 cases and were clipped during laparoscopic cholecystectomy to avoid post-operative bile leak as well as choleperitonitis. The management of biliary leak requires a team of an experienced endoscopist, radiologist and surgeon. Leakage from small or punctiform lesions of cystic duct and aberrant open bile ducts are usually best treated by endoscopic sphincterotomy and placing a stent in CBD. Additionally, a drain might be placed sonographically or under CT guidance in case of a bilioma. Early relaparoscopy provides the possibility for closure of the cystic stump or leak and a lavage. In case of diffuse peritonitis, open surgery is suggested. In present study, there were 13 (0.36%) cases of the common bile duct injuries, out of which 9 cases were identified intraoperatively and 4 manifested postoperatively with the development of jaundice, fever, pain and biliary peritonitis and were diagnosed by the postoperative ultrasound and MRCP. Laparoscopic insertion of a T-tube drain was sufficient in 4 patients and laparoscopic bile duct suturing was performed in 3 cases. The transection of the common bile duct, a major complication, occurred in 2 patients (0.05%) and this complication caused conversion to open procedure and was resolved by re-establishing the bile flow by Roux-en-Y hepaticojejunostomy.

In present study, 4 patients of biliary injury diagnosed post operatively were referred to higher centers for the management as per the protocol and later recovered after a morbidity of 3-6 month.²² 4 patients of laparoscopic cholecystectomy in our study presented with mild distention abdomen and bile discharge through umbilical port on 3rd post-operative day and were found to have pelvic choleperitoneum with normal bile ducts in postoperative ultrasonography. They were managed by putting 2-way 22F Foley catheter through umbilicus into the pelvis and giving oral antibiotics and liquid diet and recovered in a period of 7-10 days when catheter stopped draining bile and check ultrasound revealed no collection and catheter was removed and umbilical port dressing done. Postoperative biliary stricture is usually the result of excessive use of electrocautery near the CBD or radical and traumatic dissection along the CBD during laparoscopic cholecystectomy and was found in 6 patients in our study and they were managed by endoscopic balloon dilatation and CBD stenting. This has been comparable to other available studies.²³

Bowel injuries are usually caused during insertion of the trocar and dissection of adhesions from previous Frequently, they aren't surgeries. recognized intraoperatively and can be fatal. Bowel injuries can be avoided by no out-of-sight activities and trocar placement under direct vision. Bishoff et al reported 0.87% incidence during laparoscopic urological procedures.²⁴ In recent publications, the incidence of injuries to the intestine varies between 0.07 to 0.7%.25 The incidence of bowel injury in present study was 0.41% (15 cases). Five cases of iatrogenic small gut injury went unnoticed and later developed peritonitis and septicaemia and were referred to higher centers where they were taken up for laparotomy and further management. Four of these patients recovered and one died because of septicaemia and multiple organ failure. In ten patients of iatrogenic small gut injury detected while performing laparoscopic surgery, conversion to open surgery was done by midline laparotomy incision and injured segment of the gut identified and perforation site repaired using 000 vicryl and abdomen closed after peritoneal toileting with normal saline and betadine and keeping intraperitoneal tube drainage. Nine out of these 10 patients recovered after a prolonged morbidity, but one patient leaked further and was taken for re-exploration, whereby the involved segment of gut was exteriorized and thorough peritoneal lavage done, but couldn't be saved and died due to septicaemia.

The incidental finding of cholecystocolonic fistula during cholecystectomy is rare ranging from 0.06% to 0.14% as reported by Costi et al and is a late complication of cholelithiasis.²⁶ In present study, cholecystocolonic fistula was encountered in 4 (0.11%) patients and they were converted to laparotomy for open cholecystectomy along with colostomy of the involved segment of colon and later colostomy closure was done after three months. There was no mortality in such cases, though there was increased morbidity in the form of prolonged hospital stay, care of the colostomy, preparation of colon, readmission for closure of colostomy, prolonged medication and loss of work. Cholecystogastric fistula is uncommon complication of cholelithiasis.²⁷ In present study, there were dense adhesions in 2 patients in the form of wrapping of the stomach wall around the gallbladder and while separating adhesions during laparoscopic surgery, stomach got injured unnoticed in 1 patient and later patient developed peritonitis and laparotomy performed on third day and perforation in stomach repaired, but the patient died of septicaemia.

Acute pancreatitis developing during the early postoperative course is a rare complication (0.1%) especially in patients who do not have any stones in the common bile duct prior to cholecystectomy.²⁸ It presents as persistent and exaggerated pain upper abdomen radiating to back, bilious vomiting, distention abdomen, reduced bowel sounds, fever, mild jaundice and breathlessness and the diagnosis is confirmed by raised serum amylase and lipase levels and postoperative ultrasonographic findings of inflamed and edematous pancreas with free fluid in the peritoneal cavity. In our study, 9 (0.25%) patients developed postoperative pancreatitis and were readmitted and managed conservatively by intravenous fluids, nasogastric suction, intravenous antibiotics and injectable analgesics and maintaining fluid and electrolyte balance and adequate urinary output. All of them recovered over a period of 7-10 days except one patient who died of shock and multiple organ failure.

Surgical wound infection is a complication that occurs with less frequency in laparoscopic compared to open cholecystectomy.²⁹ In present study, there were 68 (1.88%) patients with the port site wound infection and 60 patients were managed by local dressings and antibiotics, whereas in 8 cases of port site discharging sinuses, tuberculosis was detected by the histopathological examination of the excised sinus tract and the patients were later treated with full course of anti tubercular drugs.

Bunting et al analyzed 7 studies that were completed in the time period between 1995 and 2010 and that included 5,984 patients who had laparoscopic cholecystectomies.³⁰ This analysis reports 99 (1.65%) cases of hernia at the

port insertion site as a postoperative complication. In present study, incisional hernia developed in 14 (0.38%) patients, out of which 4 developed in patients who underwent conversion to open surgery and 10 occurred at site of umbilical port. All hernias were later repaired laparoscopically or by conventional surgery.

This was one special case to be reported in our study. In one female patient, the outer sleeve of the veress needle got broken and left unnoticed in the peritoneal cavity while creating pneumoperitoneum. On 3rd post-operative day, patient complained of watery discharge from umbilicus and increased pain abdomen and presented with 2 cm of metallic sleeve pointing out of the umbilical port on 4th day. This was pulled out and port-site dressing done. The patient was asked to get x-ray abdomen and ultrasonography of abdomen for any complication, but reports were found to be normal and fortunately, patient did not develop any complication and recovered, though she had psychological fear for a long time. No such complication has been reported in the literature.

In modern laparoscopic surgery, conversion isn't considered to be a complication, but instead a way for the surgeon to safely finish the surgery. Schrenk et al reported 56 (4.3%) conversions among 1300 patients undergoing laparoscopic cholecystectomies.³¹ In present study, there were only 41 conversions (1.13%) and conversions were more frequent in males (73.17%) as compared to females (26.83%).

Although laparoscopic cholecystectomy has certain complications, but recent scenario shows morbidity and mortality rate lesser than the open surgery. Studies report 1.9% morbidity and 1% mortality rate due to laparoscopic cholecystectomy.³² In present study, mortality was just 0.16% (6 out of 3600 patients).

CONCLUSION

Laparoscopic cholecystectomy is the most frequently performed operations in the world and has introduced a new spectrum of complications. Major complications like bowel injury or uncontrolled bleeding from cystic or hepatic artery and CBD transection are life threatening and it is important to recognize these complications during laparoscopy so they are taken care of in a timely manner, while minor complications cause patient discomfort and prolong hospital stay. Adequate training of the operating surgeon, careful selection of the patients, the knowledge of the procedure related complications and their treatment at an earliest as well as a low threshold for conversion to open surgery are the key points for a safe laparoscopic cholecystectomy.

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Institutional Ethics Committee

REFERENCES

- Deziel DJ, Millikan KW, Economou SG, Doolas A, Ko ST, Airan MC. Complications of laparoscopic cholecystectomy: a national survey of 4,292 hospitals and an analysis of 77,604 cases. Am J Surg. 1993;165(1):9-14.
- Duca S, Bala O, Al-Hajjar N, Ian C, Puja IC, Munteanu D, et al. Laparoscopic cholecystectomy: incidents and complications. A retrospective analysis of 9542 consecutive laparoscopic operations. HPB (Oxford). 2003;5:152-8.
- 3. Stanisic V, Milicevic M, Kocev N, Stojanovic M, Vlaovic D, Babic I, et al. Prediction of difficulties in laparoscopic cholecystectomy on the base of routinely available parameters in a smaller regional hospital. Eur Rev Med Pharmacol. 2014;18:1204-11.
- 4. Schafer M, Lauper M, Krahenbuhl L. Trocar and Veress needle injuries during laparoscopy. Surg Endosc 2001;15:275-80.
- Yerdel MA, Karayalcin K, Koyuncu A, Akin B, Koksoy C, Turkcapar AG, et al Direct trocar insertion versus Veress needle insertion in laparoscopic cholecystectomy. Am J Surg. 1999;177:247-9.
- Opitz I, Gantert W, Giger U, Kocher T, Krähenbühl L. Bleeding remains a major complication during laparoscopic surgery: Analysis of the SALTS database. Langenbeck's Arch Surg. 2005;390:128-33.
- Larobina M, Nottle P. Complete evidence regarding major vascular injuries during laparoscopic access. Surg laparosc Endosc Percutan Tech. 2005;15:119-23.
- 8. Marakis G, Pavidis TE, Aimoniotou E. Major complications during laparoscopic cholecystectomy. Int Surg. 2007;92:142-6.
- 9. Kaushik R. Bleeding complications in laparoscopic cholecystectomy: incidence, mechanisms, prevention and management. J Minim Access Surg. 2010;6:59-65.
- Sarli L, Pietra N, Costi R, Grattarola M. Gallbladder perforation during laparoscopic cholecystectomy. World J Surg. 1999;23:1186-90.
- 11. Horton M, Florence MG. Unusual abscess patterns following dropped gallstones during laparoscopic cholecystectomy. Am J Surg. 1998;175:375-9.
- 12. Gurleyik E, Gurleyik G, Yucel O, Unalmiser S. Does chemical composition have an influence on the fate of intraperitoneal gallstone in rat? Surg Laparosc Endosc. 1998;8:113-6.
- 13. Pavlidis TE, Papaziogas BT, Kouteli-dakis IM, Papaziogas TB. Abdominal wall sinus due to impacting gallstone during laparoscopic cholecystectomy: an unusual complication. Surg Endsoc. 2001;16:360.
- 14. Targarona EM, Marco C, Balague C, Rodriguez J, Cugat E, Hoyuela C, et al. How, when, and why bile duct injury occurs. A comparison between open and

- laparoscopic cholecystectomy. Surg Endosc. 1998;12:322-6.
- 15. Moore MJ, Bennett CL. The learning curve for laparoscopic cholecystectomy. The Southern Surgeons Club. Am J Surg. 1995;170:55-9.
- 16. Morgenstern L, Berci G, Pasternak EH. Bile leakage after biliary tract surgery. A laparoscopic perspective. Surg Endosc. 1993;7:432-8.
- 17. Nuzzo G, Guiliante F, Giovannini I. Bile duct injury during laparoscopic cholecystectomy: results of an Italian national survey on 56591 cholecystectomies. Arch Surg. 2005;140:986-92.
- 18. Tantia O, Jain M, Khanna S, Sen B. Iatrogenic biliary injury: 13305 cholecystectomies experienced by a single surgical team over more than 13 years. Surg Endosc. 2008;22:1077–86.
- 19. Davidoff AM, Pappas TN, Murray EA, Hillier DJ, Johnson RD, Baker ME, et al Mechanisms of major biliary injury during laparoscopic cholecystectomy. Ann Surg. 1992;215:196-202.
- 20. Hanazaki K, Igarashi J, Sodeyama H, Matsuda Y. Bile leakage resulting from clip displacement of the cystic duct stump: a potential pitfall of laparoscopic cholecystectomy. Surg Endosc. 1999;13:168-71.
- 21. Balija M, Huis M, Sherd F, Bubnjar J, Stulhofer M. Laparoscopic cholecystectomy- accessory bile ducts. Acta Med Croatica. 2003;57:105-9.
- Mirza DF, Narsimhan KL, Ferraz Neto BH, Mayer AD, McMaster P, Buckels JA. Bile duct injury following laparoscopic cholecystectomy: referral pattern and management. Br J Surg. 1997;84:786-90.
- 23. Davids PH, Tanka AK, Rauws EA, van Gulik TM, van Leeuwen DJ, de Wit LT, et al. Benign biliary strictures. Surgery or endoscopy? Ann Surg. 1993;217:237-43.
- 24. Bishoff JT, Allaf ME, Kirkels W, Moore RG, Kavoussi LR, Schroder F. Laparoscopic bowel injury: incidence and clinical presentation. J Urol. 1999;161:887-90.
- 25. Schrenk P, Woisetschlager R, Rieger R, Wayand W. Mechanism, management, and prevention of laparoscopic bowel injuries. Gastrointest Endosc. 1996;43:572-4.
- 26. Costi R, Randone B, Violi V. Cholecystocolonic fistula: facts and myths. A review of the 231 published cases. J Hepato-Biliary-Pancreat Surg. 2009;16(1):8-18.
- 27. Gardner NHN. Cholecystogastric fistulae. Br Med J. 1968;3:723-4.
- 28. Gloor B, Stahel PF, Muller CA, Worni M, Buchler MW, Uhl W. Incidence and management of biliary pancreatitis in cholecystectomized patients. Results of a 7 year study. J Gastrointest Surg. 2003;7(3): 372-7.
- 29. Chuang SC, Lee KT, Chang WT, Wang SN, Kuo KK, Chen JS, et al. Risk factors for wound infection after cholecystectomy. J Formos Med Asso. 2004;103(8):607-12.

- 30. Bunting DM. Port-site hernia following laparoscopic cholecystectomy. J Soc Laparoendosc Surg. 2010;14:490-7.
- 31. Schrenk P, Woisetschlager R, Wayand WU. Laparoscopic cholecystectomy. Cause of conversions in 1,300 patients and analysis of risk factors. Surg Endosc. 1995;9:25-8.
- 32. Shea JA, Healey MJ, Berlin JA, Clarke JR, Malet PF, Staroscik RN, et al. Mortality and complications

associated with laparoscopic cholecystectomy. A meta-analysis. Ann Surg. 1996;224:609-20.

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