LAPAROSCOPIC CHOLECYSTECTOMY: AN EXPERIENCE AT LADY READING HOSPITAL, PESHAWAR

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Background: Laparoscopic Cholecystectomy originally a minimal invasive surgical technique involving less hospital stay less economical burden decreased post op complication and early mobility. The objective was to analyse data of patients undergoing laparoscopic cholecystectomy at a surgical setup. **Methods:** This study was conducted at the Department of Surgery, Lady Reading Hospital, Peshawar from 11th January 2006 till 10th January 2009. Patients aged above 14 year, presenting in the outpatient department with clinical and ultrasonographic evidence of cholecystitis and undergoing laparoscopic cholecystectomy were included in the study. The procedure performed was predominantly the four port technique for laparoscopic cholecystectomy. A proforma was prepared to collect preoperative, operative, and postoperative data. Operative data included the technique used and the difficulties ascertained during those procedures. Data was analysed using SPSS-13.0. **Results**: Of 421 patients, 387 patients fulfilled the criteria for admission to undergo the procedure. The mean age of all patients was 38.6±7.1 year ranging from 16 years to 72 year with a male to female ratio of 1**:**8.09. During the first six months 57 patients underwent the procedure for which the mean operating time was 67.4 min. During the last six months the mean operating time was 39.1±8.9 minutes. The overall rate of conversion of laparoscopic cholecystectomy was 6.4%. In comparison the last six months of the study showed one case (1.16%) in 86 patients being converted to open cholecystectomy. The most common cause foe conversion of the laparoscopic procedure to an open cholecystectomy was dense adhesions making dissection of the triangle of Calot's difficult. In 73 cases (21.4%) the gall bladder was perforated during dissection of gall bladder from the gall bladder bed. **Conclusion:** The out comes of this study during the last six months is comparable to studies conducted at more experienced centres making laparoscopic more than just an early experience in this part of the world.

Keywords: Laparoscopic, Cholecystectomy, Complications, Cholecystitis

INTRODUCTION

From the early reports on the results of laparoscopic cholecystectomy (LC)[1,2], the procedure has been found to be superior to open cholecystectomy (OC), with less morbidity and mortality[3]. It is less traumatic than open cholecystectomy resulting in fewer postoperative complaints, rapid recovery, shorter hospital stay, and minimal cosmetic disfigurement.[4–6] Revolution in the treatment of gall stones came in 1987, when first laparoscopic cholecystectomy was carried out by PhiIlip Mouret et al in Lyon[7], though first reported series was by Dubois *et al*.[8,9] It also became clear that acquiring the skills to perform this new procedure involved a substantial surgical learning curve.[10,11]

Initially, acute Cholecystitis (AC) was considered a contraindication to LC.[12,13] This is due to the belief that the inflammation, oedema and sometimes necrosis associated with AC distort the anatomy, making identification and dissection of the ductal and vascular structures difficult and thereby increasing the incidence of complications.[14] However, with increased experience and refinement of the instruments, more surgeons are performing LC in patients with AC.[15–18]

Major complications may account for morbidity in patients undergoing the procedure, as high as 2.9%.[19] They appear to be related either to the procedure itself or to the creation of the pneumoperitoneum. The group of complications related to the procedure, mainly includes bleeding from the gallbladder bed or the cystic artery, and biliary complications, i.e., spilled gallstones, biliary leak, and common bile duct injury. The majority of iatrogenic injuries can be successfully avoided by appreciating the limitations and pitfalls of laparoscopic surgery, and by carefully dissecting the Calot's triangle before dividing any structure. Most surgeons can perform this procedure quickly with a minimal conversion rate.[20] Disruption of the biliary tree after laparoscopic cholecystectomy has been reported in 0–7% of cases, and likely represents the most significant postoperative complication. Documenting the presence and extent of a bile leak is often difficult.[21]

To become proficient in minimal access techniques, the surgeon must develop skills in interpreting a three-dimensional environment as a two-dimensional image, and learn how to do familiar tasks (e.g., suture) with familiar instruments in an unfamiliar manner.[22] Moreover, the surgeon never actually touches the tissue being moved with his or her hands. This loss of tactile input is the major factor in making minimal access techniques difficult to learn.

The aim of this study was to share our experience of the early outcome following laparoscopic cholecystectomy.

MATERIAL AND METHODS

This descriptive study was carried out at the Department of Surgery, Lady Reading Hospital, Peshawar from 11th January 2006 till 10th January 2009. Patients aged above 14 years of age, presenting in the outpatient department with clinical and ultrasonographic evidence of Cholecystitis and undergoing laparoscopic cholecystectomy were included in the study. Patients with clinically evident jaundice, a common bile duct (CBD) diameter of greater than 10 mm on ultrasonography, reactivity to hepatitis B or C virus on screening tests and life threatening medically co morbid conditions were excluded from the study.

Following admission through the out patient department all patients were subjected to a detailed history and clinical examination. All patients above the age of 50 years of age and clinical evidence or suspicion of pulmonary compromise were advised a chest X-ray and electrocardiogram. Necessary action to the clinical suspicion; cardiologist and pulmonary opinions regarding fitness for the procedure were undertaken as part of a multidisciplinary approach. Those found unfit were excluded from the study.

Blood complete picture, random blood glucose, liver function tests, renal function tests, serum electrolytes, screening tests for hepatitis B and C were undertaken on all patients complying with the inclusion criteria.

The procedure performed was predominantly the four port technique for laparoscopic cholecystectomy. A 10 mm camera port infraumbilical or supra umbilical, 10 mm epigastric port and two other 5 mm ports in the midclavicular line and anterior axillary line were used although the three port with and without gallbladder hitch was used. Both the veress needle and the open (Hasson's) technique were used in the study for the creation of pneumoperitoneum maintained at an intra abdominal pressure between 12–15 mmHg. Metallic clips were used during the procedure to ligate the cystic duct and artery. The use of electrocautry was standardised as mode of achieving haemostasis although the harmonic scalpel was also variably used in cases of dense adhesions. Retrieval was achieved via a bag created from latex glove. Muscular layers both camera and epigastric port sites were apposed using vicryl 1. All collected specimen were sent for histopathology.

A proforma prepared to collect data took into account the pre operative data, operative data and postoperative data. Operative data included the technique used and the difficulties ascertained during those procedures, the presence of adhesions, wall thickness of the gall bladder, presence of pericholecystic fluid, gallstones, perforation of gallbladder and any slippage of clips or stones during the procedure and the experience of a difficult retrieval. Also collected was data regarding the duration of surgery and anaesthesia.

Post operatively all patients were advised early ambulation and on doing so urinary catheter was removed. Prophylactic antibiotics and fluids were charted according to the individual needs of the patient and decided by the attending surgeon. On the first postoperative day ultrasonography was done to see evidence of any collection.

Following discharge all patients were reviewed at one week, one month, and two months postoperatively in the outpatient department. Any associated complaints were recorded and dealt accordingly. Data was analysed using the SPSS-13.0.

RESULTS

Over a period of three years during this study 421 patients presented to the out patient department with evidence of cholecystitis or symptomatic gall bladder disease secondary to gallstones. Of these, 387 patients fulfilled the criterion for admission to undergo the procedure. Following subsequent management during the preoperative phase 18 patients were deemed unfit for the procedure. Twenty-nine patients refused the procedure.

Three hundred and forty patients underwent the procedure and were followed over the following two months which all patients attended. The mean age of all patients undergoing laparoscopic cholecystectomy were 38.6±7.1 years ranging from 16–72 years of age. Of the entire population under study patients were predominantly female that was 298 patients (87.6%) versus 42 patients that were male (12.4%) with a male to female ratio of 1:8.09.

Mean operating time of the procedure varied dramatically over the period of study with a range of 28.4–141.6 minute. During the first six months 57 patients underwent the procedure for which the mean operating time was 67.4±9.4 minute irrespective of the per operative presentation. In the following six months the mean time to each procedure was 48.3±13.4 minutes. During the last six months the mean operating time was 39.1±8.9 minute. (Table-1).

Table-1: Operative time and the rate of conversion in patients undergoing laparoscopic cholecystectomy (n=340)

Period of study	No. of patients	Mean operating time in minutes (Mean±SD)	Conversion Rate to open n (%)
11th Jan 2006–10th Jul 2006	57	67.4±9.4	8 (14.03)
11th Jul 2006–10th Jan 2007	54	48.3±13.4	5 (9.25)
11th Jan 2007–10th Jul 2007	38	49.6±6.7)	4 (10.5)
11th Jul 2007–10th Jan 2008	49	43.5±7.3	3 (6.12)
11th Jan 2008–10th Jul 2008	56	43.1±9.3	1 (1.78)
11th Jul 2008–10th Jan 2009	86	39.1±8.9	1 (1.16)
Total	**340**	**48.5±12.1**	**22 (6.4)**

The overall rate of conversion of laparoscopic cholecystectomy was 6.4%. During the first six months 8 patients (14.03%) underwent conversion to open cholecystectomy during the procedure as a result of facing difficulty. In comparison the last six months of the study showed one case (1.16%) in 86 patients being converted to open cholecystectomy. (Table-1).

Post operative stay excluding cases converted to open was of a mean duration of 2.88 days (±0.83) with a range of 2–10 days.

The most common cause for conversion of the laparoscopic procedure to an open cholecystectomy was dense adhesions making dissection of the triangle of Calot's difficult. Eight cases (2.35%) in all were converted to open cholecystectomy due to unclear anatomy due to adhesions. In 5 cases (1.3%) conversion was due to bleeding secondary to injury to cystic artery or due to the presence of an unrecognised accessory branch. In 2 cases (0.58%) the procedure was aborted and converted to an open procedure due to injury to the biliary tract. In 2 cases (0.58%) there was an evident tumour involving the biliary tract. (Table-2).

Table-2: Reasons for the conversion to open Cholecystectomy (n=340)

Cause	No. (%)
Unclear anatomy in the triangle of Calot's	8 (2.35)
Bleeding from cystic artery or accessory branch	5 (1.3)
Suspected injury to the biliary tract	2 (0.58)
Tumour invading the biliary tract	2 (0.58)
Time factor	1 (0.29)
Per operative technical problems	1 (0.29)
Suspected injury to the colon	1 (0.29)
Choledocholithiasis	1 (0.29)
Excessive oozing from gallbladder bed	1 (0.29)

The preoperative findings in field of dissection and related difficulties in the process of dissection varied with the presentation of disease of the gall bladder. Of the 340 cases, the laparoscopic findings in 212 cases (62.3%) was cholecystolithiasis simplex. Pericholecystic adhesions were found in 118 cases (34.7%). Acute Cholecystitis was found in 76 cases (22.3%) preoperatively. In 13 (3.8%) cases mucocoele of gall bladder was seen. Empyema gallbladder was seen in 5 cases (1.47%). (Table-3).

Of all the cases only one patient expired on the 1st postoperative day secondary to pulmonary embolism. In 73 cases (21.4%) the gall bladder was perforated during dissection of gall bladder from the gall bladder bed. The most frequent postoperative complication following laparoscopic procedure was the presence of an umbilical wound stitch sinus that was observed on the first visit in the out patient department; one week following surgery. Umbilical wound stitch sinus was observed in 31 cases (9.1%). Umbilical wound infection was found in 12 cases (3.5%). Biloma formation (biliary collection) was found in 2 cases (0.58%). (Table-4).

Table-3: Operative finding during laparoscopic cholecystectomy (n=340)

Operative findings	No. of cases (%)
Cholecystolithiasis simplex	**212** (62.3%)
Pericholecystic adhesion	**118** (34.7%).
Acute cholecystitis	**76** (22.3%)
Mucocoele of gall bladder	**13** (3.8%)
Empyema gallbladder	**5** (1.47%).
Tumour in field of dissection	**2** (0.58%)
Gangrenous cholecystitis	**2** (0.58%)
Perforated gallbladder	**1** (0.29%)

Table-4: Operative and postoperative complications including successful and converted cases in patients undergoing laparoscopic cholecystectomy (n=340)

Complication	Patients (%)	Management
Gall bladder perforation during dissection	**73** (21.4%)	Application of clip or hold of grasper followed by lavage
Stone spillage	**15** (4.41%)	Collection of stones peroperatively followed by lavage
Trocar injury to the colon	**1** (0.29%)	Converted to open followed by repair
Injury to the common bile duct	**2** (0.58%)	Converted to open
Umbilical stitch sinus	**31** (9.1%).	Antibiotic and removal of suture material
Umbilical wound infection	**12** (3.5%).	Antibiotics and removal of suture material
Epigastric wound infection	**8** (2.35%)	antibiotics
Subcostal wound infection	**2** (0.58%)	antibiotics
Biloma formation	**2** (0.58%)	Open drainage
Shoulder pain	**109** (32.05%)	Analgesics and reassurance
Missed stones in Common bile duct	**8** (2.35%)	ERCP
Subcutaneous echymosis	**4** (1.17%)	-
Right pleural effusion with basal pneumonia	**1** (0.29%)	antibiotics
Death	**1** (0.29%)	-

In cases of perforation of gall bladder clips were applies at the site of perforation or alternatively the perforation was grasped with a grasper. All these cases were followed peroperatively with a peritoneal lavage and the placement of a drain in the sub hepatic space undertaken. In one case (0.29%) with injury to the colon during the passage of a trocar in the anterior axillary line was recognised and the procedure was converted to an open one where by the colon was repaired with vicryl 3/0.

Suspected injury to the common bile duct (CBD) secondary to the tenting of the CBD was observed in 2 cases (0.58%) and was converted to open. Umbilical stitch sinus was treated by antibiotics and removal of the stitch material. Epigastric wound infection was seen in 8 cases (2.35%) that were treated with antibiotics.

Biloma formation was seen in two cases (0.58%) that was detected on the first postoperative day by ultrasonography. One showed evidence of collection of over 250 ml of fluid that required open drainage and ligature of a slipped clip. In the other case the ultrasonography showed collection of 17 ml that settled by conservative management.

For patients with persistent pain signifying amongst a group of post-cholecystectomy disorders the patients were investigated by ultrasonological survey of the common bile duct. Those patients that presented with a stone in the CBD were subjected to endoscopic retrograde cholaniopancreatography procedure for drainage.

DISCUSSION

Laparoscopic cholecystectomy is undoubtedly the 'gold standard' in the management of Cholecystitis. Only until late was it considered that acute Cholecystitis was a relative contraindication to the procedure.[23] In this study the females were predominant share of all the cases that is evident by the disease process being more frequent in females. These findings were consistent with other authors from the region such as Mohammad *et al.*[20]

A fair share of surgeons are opting their patients to undergo the laparoscopic version of surgical modality for the disease.[24,25] In this part of the world due to lack of resources and considering the long curve for learning minimal invasive procedures there is still a lack of expertise for such a commonly performed operation.[26] The procedure carries a lower morbidity and lesser duration of postoperative hospital stay rate as compared to the open cholecystectomy.[27]

In this study all patients over a period of three years were subjected to a team of surgeons in the process of learning to perfect the art of laparoscopic cholecystectomy. The conversion rate in this study over the period decreased with comparatively improved results in the last six months of study. By and large these were comparable to a long list of series. (Table-5).

Table-5: Conversion rates in various series

Study	Conversion rate
Tarcoveanu *et al*[24]	16.0%
Ishiazaki *et al*[25]	6.4%
Raza *et al*[28]	11.11%
Bhopal *et al* [29]	7.5%
Cheema *et al*[30]	2.0%
Elder *et al*[31]	12.5%
Jaffary *et al*[32]	3.0%
This Study	6.4%

The conversion rate is high amongst studies from developing countries when compared to the studies from developed countries.[33] Among the reasons for conversion in this study most common cause was due to dense adhesions as described in other studies.[34]

Most conversions happen after a simple inspection or a minimum dissection, and the decision to convert should be considered as a sign of surgical maturity rather than a failure. Conversion should be opted for in the beginning and at the time of recognition of a difficult dissection rather than after the occurrence of complication.[35] The most frequent cause of conversions, as was the case in this study; is unclear anatomy in the triangle of Calot's due to dense adhesions that have formed secondary to repeated inflammatory process.[36]

A long list of complications of exists with laparoscopic cholecystectomy.[37] In this study most of the operative complications included injury to the neighbouring structures and gallbladder perforation. The usual cause for gallbladder perforation in this study was poor visibility or hastening and not finding the plane between the gall bladder and its bed. In this series the method was by using electrocautry. Unlike Raza *et al*[28] and Mufti *et al*[33] none of our cases presented post operatively with bleeding or draining of any sort.

In one case injury to the colon (0.29%) and two cases (0.58%) of injury to the common bile duct were suspected for which the procedure was converted to open cholecystectomy. Such were the complications of surgery resulting conversion to some earlier studies.[38]

The incidence of wound infection in this study was higher than most studies.[35,38] This could be attributed to improper disinfection in our part of the world due to increased load and lack of disposable instruments. The most common infection was a stitch sinus of the material used to appose the muscular layers of the umbilical wound that was used as a 10 mm port for the placement of the camera. The next most common infection in the study was infection of the wound in the umbilicus followed by the epigastric port all that required antibiotic therapy and removal of retained suture material, if present. Neither of these cases presented with herniation considering the length of follow up being only two months.

As a part of this report bile duct injury was observed in two cases due to tenting of the common bile duct during the application of the clips, fortunately to be recognised during surgery this was acceptable as this study included all forms of presentation of the disease.[40]

Missed stone were later observed on follow up of patients in the outpatient department in 8 patients (2.35%). Such is due to the lack of facilities for intraoperative cholangiogram or the frequent use of a choledocoscope. Retained bile duct stones after cholecystectomy are a well recognised postoperative complication. The reported incidence after laparoscopic cholecystectomy is between 0.5–2%. In one small series, the frequency of post laparoscopic cholecystectomy retained stones was 2.5%.[41] However, after open cholecystectomy the incidence varies from 5–

15%.[42] In our series, ERCP successfully dealt with retained CBD stones in all 8 patients.

Calculi smaller than 3 mm can pass spontaneously if the sphincter of oddi is not stenotic but this may be complicated by pancreatitis or cholangitis. Stones of less than 10 mm in diameter can be treated via endoscopic papillary balloon dilatation. Those larger than 11 mm in diameter are managed via endoscopic sphincterotomy with a 10–12 mm papillary incision. Large CBD stones (>2 Cm diameter) in the current study, unsuitable, for simple extraction were seen in 10 cases. These large calculi can first be crushed with a biliary lithotripter. The residual stone fragments can be flushed with normal saline and recovered with basket or balloon.[43]

Bile leak is the most common technical complication of LC occuring in 0.2–2.0% of patients.[23] In this study the frequency was comparable with only one of them requiring open drainage whereas the other settled in the post operative period.

Although, the risk factors for conversion to open cholecystectomy have been evaluated, Zucker *et al*[18] have concluded that 'the surgeon's experience is perhaps the most important factor that determines whether patients with Acute Cholecystitis can undergo successful Laparoscopic Cholecystectomy'. All LCs in this series were performed with limited experience in laparoscopic cholecystectomy.

The operating time at the beginning of the study had surely passed the time required to carry out an open cholecystectomy but in the latter phase of the study the mean operating time matches the duration required for open cholecystectomy.

The single most important predictor of adverse events in minimal access procedures is the experience of the provider with the specific operation. Surgeons must acquire the necessary technical skills and expertise before performing new minimally invasive procedures on patients.

CONCLUSION

The out comes of this study during the last six months is comparable to studies conducted at more experienced centres making laparoscopic more than just an early experience in this part of the world.

REFERENCES

1. Dubois F, Icard P, Berthelot G, Levard H. Coelioscopic cholecystectomy: preliminary report of 36 cases. Ann Surg 1990;211:60–2.
2. Reddick EJ, Olsen DO. Laparoscopic laser cholecystectomy: a comparison with minilap cholecystectomy. Surg Endosc 1989;3(3):131–3.
3. Hannan EL, Imperato PJ, Nemer RP, Starr H. Laparoscopic and open cholecystectomy in New York State. Mortality, complications and choice of procedure. Surgery 1999;125:223–31.
4. The Southern Surgeons Club. A prospective analysis of 1518 laparoscopic cholecystectomies. N Eng J Med 1991;324:1073–8.
5. Schirmer BD, Edge SB, Dix J, Hyser MJ, Hanks JB, Jones RS. Laparoscopic cholecystectomy: treatment of choice for symptomatic cholelithiasis. Ann Surg 1991;213:665–77.
6. NIH Consensus Development Panel on Gallstones and Laparoscopic Cholecystectomy: Gallstones and laparoscopic cholecystectomy. JAMA 1993;269:1018–24.
7. Hugo WT, James M. Principles and present status of laparoscopic general surgery. Surg Int 1997;37:73–5.
8. Testas P, Dewatteville JC. Laparoscopic cholecystectomy. Ann Gastroenterol Hepatol 1993;29:300–3.
9. Suter M, Meyer A. A 10-year experience with the use of laparoscopic cholecystectomy for acute cholecystitis: is it safe? Surg Endosc 2001;15:1187–92.
10. Lekawa M, Shapiro SJ, Gordon LA, Rothbart J, Hiatt JR. The laparoscopic learning curve. Surg Laparosc Endosc 1995;5:455–8.
11. Dashow L, Friedman I, Kempner R, Rudick J, McSherry C. Initial experience with laparoscopic cholecystectomy at the Beth Israel Medical Center. Surg Gynecol Obstet 1992;175:25–30.
12. Gadacz TR, Talamini MA, Lillemoe KD, Yeo CJ. Laparoscopic cholecystectomy. Surg Clin North Am 1990;70:1249–62.
13. Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H, Buess G, et al. The European experience with laparoscopic cholecystectomy. Am J Surg 1991;161:385–7.
14. Cameron JC, Gadacz TR. Laparoscopic cholecystectomy (editorial). Ann Surg 1991;214:251.
15. Wilson RG, Macintyre IMC, Nixon SJ, Saunders JH, Varma JS, King PM. Laparoscopic cholecystectomy as a safe and effective treatment for severe acute chlecystitis. BMJ 1992;305:394–6.
16. Rattner DW, Ferguson C, Warshaw A. Factors associated with successful laparoscopic cholecystectomy for acute cholecystitis. Ann Surg 1993;217:233–6.
17. Wiesen SM, Unger SW, Barkin JS, Edelman DS, Scott JS, Unger HM. Laparoscopic cholecystectomy: the procedure of choice for acute cholecystitis. Am J Gastroenterol 1993;88:334–7
18. Zucker KA, Flowers JL, Bailey RW, Graham SM, Buell J, Imbembo AL. Laparoscopic management of acute cholecystitis. Am J Surg 1993;165:508–14.
19. Suhocki PV, Meyers WC. Injury to aberrant bile ducts during cholecystectomy: a common cause of diagnostic error and treatment delay. Am J Roentgenol 1999;172:955–9.
20. Mohammad S, Hinduja T, Fatima S. Complications of laparoscopic cholecystectomy in acute cholecystitis. J Surg Pak 2008;13:59–61.
21. Walker AT, Shapiro AW, Brooks DC, Braver JM, Tumeh SS. Bile duct disruption and biloma after laparoscopic cholecystectomy: imaging evaluation. Am J Roentgenol 1992;158:785–9.
22. Peters JH, Ellison EC, Innes JT, Liss JL, Nichols KE, Lomano JM, et al. Safety and efficacy of laparoscopic cholecystectomy. A prospective analysis of 100 initial patients. Ann Surg 1991;213:3–12.
23. Peters JH, Ollila D, Nichols KE, Gibbons GD, Davanzo MA, Miller J, et al. Diagnosis and management of bile leaks following laparoscopic eholecystectomy. Surg Laparosc Endosc 1994;4:163–70.
24. Tarcoveanu E, Nicculesce D, Georgescu S, Bradea C, Epure O. Conversion in Laparoscopic cholecystectomy. Chirugia 2005;100:437–44.
25. Ishiazaki Y, Miwa K, Yoshimoto J, Sugo H, Kawasaki S. Conversion of laparoscopic to open cholecystectomy between 1993 and 2004. Br J Surg 2006;93:987–91.
26. Iqbal J, Ahmed B, Iqbal Q. Rashid A. Laparoscopic cholecystectomy vs open cholecystectomy, morbidity comparison. Professional Med J 2002;9:226–35.
27. Roviaro GC, Macioco M, Rebuffat C, Varoli F, Vergani V, Rabughino G, *et al.* Complications following cholecystectomy. J R Coll Surg Edinb 1997;42:324–8.

28. Raza M, Wasty WH, Habib L, Farhat J, Saria MS, Sarwar M. An audit of Cholecystectomy. Pak J Surg 2006;23(2):100–3.
29. Bhopal FG, Rai MA, Iqbal MA. A comparative study of morbidity in laparoscopic and open cholecystectomy. J Surg Pak 1998;3:2–7.
30. Cheema MA, Munir A, Zahid MA, An experience of laparoscopic cholecystectomy at Lahore General Hospital. Biomedica 2001;17:32–6.
31. Elder S, Qunin J, Chourih, Sabo E, Matter I, Nashe E, Schein M. Safety of laparoscopic cholecystectomy in a teaching services: A prospective trial. Surg Lap Endosc 1996;6(3):218–20.
32. Jaffary SA, Shamim MS, Raza SJ, Dastagir A. Instrument failure; a preventable cause of conversion in laparoscopic cholecystectomy. Pak J Surg 2006;23(2):92–5.
33. Mufti TS, Ahmad S, Naveed D, Akbar M, Zafar A. Laparoscopic cholecystectomy: an early experience at Ayub Teaching Hospital Abbottabad. J Ayub Med Coll Abbottabad 2007;19:42–4.
34. Abbassi SA, Azami R Haleem A, Tariq GR, Iqbal A, Almas D, et al. An audit of Laparoscopic cholecystectomy performed at PNS Shifa. Pak Armed Forces Med J 2003;53(1):51–8.
35. Tayab M, Ahsan RS, Khan MR, Azami R. Conversion from laproscopic to open cholecystectomy. Multivariant analysis of preoperative risk factors. J Postgrad Med 2005;51:17–20.
36. Singh K, Ohri A. Laparoscopic cholecystectomy –is there a need to convert? J Min Acces Surg 2005;1:59–62.
37. Arain GM, Hassan A, Randhawa MH, Malik SA. Laparoscopic Cholecystectomy and its complications: a study of 1100 cases. Pak J Gastroentrol 1998;12(1-2):29–35.
38. Z'graggen K, Wehrli H, Metzger A, Buehler M, Frei E, Klaiber C. Complications of laparoscopic cholecystectomy in Switzerland: a prospective 3-year study of 10,174 patients. Swiss Association of Laparoscopic and Thoracoscopic Surgery. Surg Endosc 1998;12:1303–10.
39. McDonald MP, Munson JL, Sanders L, Tsao J, Buyske J. Consequence of lost gallstone. Surg Endosc 1997;11:774–7.
40. MacFayden BV Jr, Vennichio R, Ricardo AE, Mathis CR. Bile duct injury after laparoscopic cholecystectomy. The United States experience. Surg Endosc 1998;12:315–21.
41. Anwar S, Rahim R, Agwunobi A, Bancewicz J. The role of ERCP in management of retained bile duct stones after laparoscopic cholecystectomy. J N Z Med Assoc 2004;117(1203):U1102. Available at: http://www.nzma.org.nz/journal/117-1203/1102/
42. Rogers AL, Fraha GJ, Beamer RL, Chang FC. Incidence and associated mortality of retained common bile duct stones. Am J Surg 1985;150:690–3.
43. Shaw MJ, Mackie RD, Moore JP, Dorsher PJ, Freeman ML, Meier PB, et al. Results of a multicenter trial using a mechanical lithotripter for the treatment of large common bile duct stones. Am J Gastroenterol 1993;88:730–3.

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