EARLY EXPERIENCE WITH ULTRASONIC (HARMONIC) DISSECTION DURING LAPAROSCOPIC CHOLECYSTECTOMY: IS IT SAFE AND ACHIEVABLE?

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ABSTRACT

OBJECTIVE: to evaluate the safety of ultrasonic (harmonic) dissection during laparoscopic cholecystectomy in terms of gall bladder perforation.

METHODOLOGY: This descriptive study was conducted at surgical B unit of Lady Reading Hospital, Peshawar from July 2007 to December 2008, on 120 patients with symptomatic gallstones. Patients fulfilling the study criteria, were selected on consecutive non-probability sampling technique. All the patients were operated laproscopicaly through standard four-port technique. Ultrasonic device (harmonic) was used for GB dissection off its bed. Intraoperatively bile leak or stone spillage was looked for suggesting GB perforation. The demographic and clinical (intraoperative) data of the all the patients were recorded in a proforma and data was analyzed with SPSS version-16.

RESULTS: The age of the patients ranged from 18 to 70 years with the maximum number in the 4th decade. The mean age was 40.15±12.632 years. The male to female ratio was 1: 6.66. The mean hospital stay was 3.37±0.766 days. Patients with gall bladder perforation were 20 (16.7%) and 16.6% of the gall bladder perforation occurred in 21 to 50 years of age. The gall bladder perforation in male and female were 8.3% and 8.3% respectively.

CONCLUSION: Ultrasonic dissection of gall bladder from its bed is a safe technique and carried 16.7% risk of all bladder perforation. In resources limited countries, proper training of laparoscopic surgery should be encouraged.

KEY WORDS: Ultrasonic Device, Gall bladder Perforation, Safety.

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INTRODUCTION

Laparoscopic cholecystectomy performed for the first time in 1987 by Movret in France is now the gold standard for the treatment of symptomatic gallstones.[1,2] It has replaced the open technique for the majority of 770,000 cholecystectomies performed in US each year.[3]

Laparoscopic cholecystectomy though less invasive is still commonly complicated by perforation of gall bladder and spillage of gallstones into peritoneal cavity. These complications occur during dissection of the gall bladder (GB) off its bed, grasping and retrieval of GB.[4,5] GB dissection off its bed is routinely performed with electro-cautery in laparoscopic cholecystectomy.[6] Due to potential adverse effects in conventional electro-cautery like inadvertent and unrecognized intra-abdominal and billiary tract injuries and electrical arcing injuries; use of ultrasonic method of dissection of GB is getting more popular.[5,7] The incidence of GB perforation ranges from 6-40% and about 13-32% of patients may get late complications due to spillage of infected bile and spilled gall stones.[8] In majority of the cases, these lost stones usually cause no problem; but 0.08-0.3% of patients develop complications.[9,10] The most common complication of spilled intra-peritoneal gallstones is abscess formation accounting for 60% of complications.[9] Other complications include small bowel obstruction, fistula formations, cholelithoptysis, pleural empyema, stones in hernia sac, ovary and tubalithiasis.[11]

The retrieval of all dropped stones is sometime not possible with laparoscopic techniques. During the early period, the fate of these lost stones was considered benign without serious consequences. However, there has been increasing

reports of infectious complications due to un-retrieved stones after laparoscopic cholecystectomy which require reoperation.[10,11]

Chances of bile spillage are reduced by the use of ultrasonic dissection.[6,7] Incidence of GB perforation during ultrasonic method of dissection have been reported from 11% to 16%.[12,13] The use of ultrasonic dissection method is still under debate such as lack of sufficient clinical trials in its support, fear of use and scarce regional data.[5,13] The current study was designed to evaluate the safety of ultrasonic dissection in terms of gall bladder perforation, so the results of this study will generate local statistics.

METHODOLOGY

This prospective descriptive study was conducted at surgical B unit, postgraduate medical institute /Lady Reading Hospital Peshawar Pakistan, from July 2007 to December 2008. Both male and female patients, above 18 years of age, admitted in surgical B unit with symptomatic gallstones, meeting the criteria were selected for the study by consecutive nonprobability sampling technique. Patients with clinically evident jaundice, common bile duct stones, acute cholecystitis, emphyema gall bladder, hydrophic gall bladder on ultrasound, diabetes mellitus, coagulopathies on screening test, positive to hepatitis B surface antigen or antibodies to hepatitis C virus, previous abdominal surgery, pregnant women and perforation during retrieval at port site were excluded from the study. All patients were diagnosed taking detailed history, performing complete physical examination and investigations like ultrasound abdomen (for calculi in GB, normal or thickened GB wall), and other base line blood tests such as full blood count, blood urea and serum creatinine, serum electrolytes, liver function tests and screening for hepatitis B & C viruses.

A written informed consent explaining the risks and benefits of the procedure, was obtained from the patients fulfilling the selection criteria. All patients were operated under general anesthesia. A single consultant surgeon carried out all the operations through laparoscope by using standard 4-port technique. Pneumoperitonuem was created through open technique and pressure was kept at 12 mmHg.

GB dissection off its bed was done by using ultrasonic (harmonic) device. Intra-operatively, bile leak or stone spillage was looked for suggesting GB perforation. GB perforation was defined as any visible rent (any size) in GB wall with bile leak (irrespective of amount) and/or spillage of gallstone into the peritoneal cavity, observed intra-operatively.

Exclusion criteria were strictly followed to control confounders and bias in the study. The demographic and clinical (intraoperative) data of the all the patients such as name, age, gender, GB perforation was recorded in a proforma.

The data was analyzed with SPSS version 16. Frequency and percentages were computed for categorical variables such as gender and GB perforation while numerical variables such as age was presented with mean ± SD.

RESULTS

A total of 120 patients were included in the study and operated laparoscopically through standard four ports technique and ultrasonic device(hormonic) was used for gall bladder dissection off its bed. The age of the patients ranged from 25 to 68 years with the maximum number in the 4th decade. The mean age was 42.4± 13.29 years.

The male to female ratio was 1: 6.66. The hospital stay was 1-3 days. Patients with gall bladder perforation were 20 (16.7%). The frequency of gall bladder perforation in male and female patients of different age groups is shown in Table I and II.

TABLE NO. I: FREQUENCY OF GALL BLADDER PERFORATION IN PATIENTS UNDERGOING ULTRASONIC DISSECTION

Sex	Perforation of Gall bladder		Total
	Yes	No	
Male	10 (8.3%)	8 (6.7%)	18 (15%)
Female	10 (8.3%)	92 (76.7%)	102 (85%)
Total	20 (16.7%)	100 (83.3%)	120 (100%)

TABLE NO. II: PERFORATION OF GALL BLADDER IN PATIENTS WITH DIFFERENT AGE GROUPS AGES

Age Range in Years	Perforation of Gall bladder		Total
	Yes	No	
≤ 20	1 (0.8%)	5 (4.2%)	6 (5.0%)
21 - 30	5 (4.2%)	24 (20%)	29 (24.2%)
31 - 40	5 (4.2%)	27 (22.5%)	32 (26.7%)
41 - 50	5 (4.2%)	29 (24.2%)	34 (28.3%)
51 - 60	3 (2.5%)	10 (8.3%)	13 (10.8%)
61 - 70	1 (0.8%)	5 (4.2%)	6 (5.0%)
Total	20 (16.7%)	100 (83.3%)	120 (100%)

DISCUSSION

Since its introduction in 1987, laparoscopic cholecystectomy rapidly gained popularity in modern times to the extent that it is now being regarded as the gold standard for treating symptomatic gallstones disease.[1,2,14,15] Efforts are being carried out to minimize the hazards related to laparoscopic cholecystectomy by introduction of newer and advanced technologies.[7,13]

Injuries to the CBD and complications from lost gallstones are the two main problems in laparoscopic cholecystectomy. Although, with advancing expertise of the operating surgeons, the rate of CBD injuries in laparoscopic cholecystectomy is declining; however, there is no change in the incidence of lost gallstones.[16]

Studies have shown that ultrasonic dissection of GB is safe and effective modality with minimal chances of accidental GB perforation and bile spillage. There is minimal lateral energy spread and lower distant tissue damage than with conventional electro-cautery.[6,17]

The risk factors identified for iatrogenic GB perforation during Laparoscopic cholecystectomy include surgeon experience, acute cholecystits, adhesions, obesity, old age and male gender.[18,19] GB perforation can be reduced by if proper dissection is carried out with caution and surgery is performed by experienced and skillful surgeon. Even if GB perforation occurs, further damage by spilled bile and gallstones can be curtailed by using suction devices and endobag. Closing the hole in the GB by grasp forceps, endoclip or endoloop and thorough irrigation of the abdominal cavity can further reduce the postoperative complications.

It was observed in our study that GB perforation was relatively more frequent in male gender and there was no effect of age on GB perforation. The reason might be that, in our study the number of female patients was more than male patients and anatomy of hepatobiliary system, which is difficult to dissect in male than female. Although there is inconsistent data regarding the effect of male gender and age on iatrogenic GB perforation but it has been reported in few studies that incidence of iatrogenic GB perforation is more common in male gender and age has no significant effect on perforation.[20,21]

In our study the frequency of GB perforation (16.7%) is slightly high than other studies (table III) which could be due to early experience with harmonic dissection. From these results, it appears that harmonic dissection for laparoscopic cholecystectomy can be achieved with an acceptably low serious complication rate.

We were unable to study various patient's characteristics and co-morbidities considered as potential risk factors for per-operative outcome including body mass index, and American Society of Anesthesiologists (ASA) score and surgeon experience. Furthermore, it is not linked to a pre-determined standard protocol. We recommend a large multicenter prospective, randomized controlled trial to generate local statistical data.

CONCLUSION

Ultrasonic dissection of gall bladder from its bed is a safe technique and carried 16.7% risk of all bladder perforation. In resources limited countries, proper training of laparoscopic surgery should be encouraged so that more expertise may be produced with much better results. Large scale, multicenter prospective, randomized controlled trial may be carried out to generate local statistical data on safety of ultrasonic dissection during laparoscopic cholecystectomy..

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

SA: Conception and design, acquisition of data, drafting the manuscript, final approval of the version to be published

MA& LAS: acquisition of data, final approval of the version to be published

MH & MU: analysis and interpretation of data, drafting the manuscript, final approval of the version to be published

MUDS: critical revision, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declare no conflict of interest

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