ASSOCIATION OF IATROGENIC GALL BLADDER PERFORATION IN LAPAROSCOPIC CHOLECYSTECTOMY WITH HARMONIC SCALPEL AND ELECTROSURGICAL CAUTERY

Naveed Ahmed*, Muhammad Amir Main, Syed Hashim Zaidi***, Shahzad Inam****, Jamshed Ahmed Rehmani****

*Combined Military Hospital Skardu, **Combined Military Hospital Lahore, ***Pakistan Naval ship Shifa Karachi, ****Combined Military Hospital Bannu

ABSTRACT

Objective: To compare the operative time and incidence of iatrogenic gallbladder perforation in laparoscopic cholecystectomies while using harmonic scalpel and electrosurgical cautery hook to raise the gall bladder from its bed, in all age groups in both genders.

Study Design: Randomized controlled trial.

Place and Duration of Study: Combined Military Hospital Rawalpindi, Six months with effect from Feb 2008.

Patients and Methods: Patients undergoing elective laparoscopic cholecystectomy meeting the inclusion criteria were included in the study, after taking written informed consent and approval of ethics committee. They were divided into two groups "A" and "B" of fifty five each. In Group "A", patients underwent laparoscopic cholecystectomies by using harmonic scalpel for dissection of gallbladder from its bed. In Group "B", patients underwent laparoscopic cholecystectomy by using electrosurgical cautery for dissection of gallbladder from its bed.

Results: There is an increased risk of iatrogenic gallbladder perforation, and an increased operative time in laparoscopic cholecystectomies by using electrosurgical cautery as compared to harmonic scalpel.

Conclusion: Use of harmonic scalpel is more feasible and safe in laparoscopic cholecystectomies for avoiding iatrogenic gallbladder perforation and to complete the procedure in lesser time.

Keywords: Laparoscopic cholecystectomies, Harmonic scalpel, Gallbladder perforation.

INTRODUCTION

Gallstones are the most common biliary pathology. The vast majority of subjects (more than 85%) is asymptomatic and when such patients are followed, between 1% and 4% per year will develop symptoms. The strong recommendation for asymptomatic stones is expectant management.[1]

For symptomatic gallstones, cholecystectomy is the treatment of choice. Cholecystectomy can be done either by open method or laparo scopically but operative treatment should be avoided in acute attack because laparoscopic cholecystectomy during an acute attack of cholecystitis is associated with a significantly higher incidence of iatrogenic gallbladder perforation.[2]

Minimal access surgery is known as the "marriage of modern technology" and has become the procedure of choice these days because of the advantages the patient and the surgeon get out of it like cost effectiveness, short operating times, short hospital stay and faster recuperation. Laparoscopic cholecy stectomy has become the standard treatment for symptomatic cholelithiasis.[3] Despite all the advantages, laparoscopic cholecystectomy is also associated with a number of problems like gallbladder perforation, bleeding and cardiac arrythmias[4]. Perforation can occur during traction, grasping and dissection of the gallbladder[3]. Long term morbidity after peroperative gallbladder perforation can be avoided by total and complete recuperation of gallstones spilled and local treatment of bile contamination with copious local irrigation and antibiotics postoperatively.[5] **In laparoscopic cholecystectomy**, a rigid endoscope is introduced through a metal sleeve in to the peritoneal cavity, which has been previously inflated with carbon dioxide to produce a

Correspondence: Dr. Naveed Ahmed, CMH Skardu
Email: amcolian22@gmail.com
Received: 04 April 2012; Accepted: 07 Aug 2012

pneumoperitoneum. Further metal sleeves or ports are inserted to enable instrument access and their use for dissection. To dissect the gallbladder from its bed, either harmonic scalpel or electrosurgical cautery can be used. Harmonic scalpel utilizes high frequency vibration to achieve both vessel sealing and tissue cutting effects.The active blade moves to and fro against an inactive jaw while grasping the tissue between the two. No smoke is produced during this process. The advantages of harmonic scalpel are excellent haemostasis even for vessels like cystic artery, quicker dissection,avoidance of collateral thermal injuries and reduced operating time, even least experienced surgeon can complete the procedure in significantly shorter time as compared with electrosurgical cautery[6]. Harmonic scalpel is even been advocated for ligation of cystic duct, thereby avoiding the need for use of clips[7]. The rationale of our study was that laparoscopic cholecystectomy is the preferred mode of treatment for majority of patients because of better outcome, short hospital stay, less complications and good cosmesis. Objective of this study was to compare the operative time and incidence of iatrogenic gallbladder perforation in laparoscopic cholecystectomy while using harmonic scalpel and electrosurgical cautery hook to raise the gall bladder from its bed, in all age groups in both genders.

PATIENTS AND METHODS

One hundred and ten consecutive patients undergoing elective laparoscopic cholecystectomy meeting the selection criteria of all diagnosed cases of cholelithiasis, regardless of age and gender were included in the study, after taking written informed consent and approval of ethics committee. They were divided in to two groups "A" and "B" of fifty five each. Patients with common bile duct stones, obstructive jaundice,empyema of gall bladder, Intraoperative common bile duct injury ,tumors of gall bladder,hepatitis "B" and "C" positive cases, cholangitis, acute pancreatitis, past history of upper abdominal surgery, patients converted to open cholecystectomy, cases operated by other than the consultant mentioned were not include in the study.

In group "A" patients underwent laparoscopic cholecystectomy by using harmonic scalpel for dissection of gallbladder from its bed. The specifications of the instrument were:

Nomenclature: Ultrasonic Harmonic Scalpel using harmonic ace shear

(Ethicon Endosurgery)

Settings: Minimum=30000 Hz

Maximum = 50000 Hz

In group "B" patients underwent laparoscopic cholecystectomy by using electrosurgical cautery for dissection of gallbladder from its bed. The specifications of instrument were:

Nomenclature: Geister ESU-X 350

Settings: Cutting (30) = Blend mode

Coagulation (30) = Soft mode

Hook: "L" shaped

Control: Foot control

Patients were prepared for surgery after taking a detailed history, a thorough physical examination and investigations like abdominal ultrasonography, complete blood counts, chest radiographs, liver function tests, serum urea and creatinine, serum electrolytes, HBsAg, anti HCV antibodies and ECG. They were admitted one day before the operation. The group to the patient was allocated through purposive (non probability) sampling technique. The operations were performed under general anaesthesia by a consultant laparoscopic surgeon who had experience of more than 800 laparoscopic cholecystectomies. Patients were discharged depending upon the individual response.

Data was entered in a specifically designed proforma. Comparison of data of intraoperative complications and operative time was done by

specific tests on SPSS version 10. Independent sample t-test was used to compare the operative time by using harmonic scalpel and electrosurgical cautery. Chi-square test was used to compare both instruments in terms of intraoperative gallbladder perforation at 5% level of significance. *p*-value <0.05 was considered significant.

RESULTS

The study population comprised of one hundred and ten patients, with symptomatic cholelithiasis, which were divided in to two groups "A" and "B" that underwent laparoscopic cholecystectomy by using harmonic scalpel and electrocautery respectively. The patients were randomized in both the groups using Random Number Table. Twenty four male and 86 female patients were included. No subjects were dropped out or lost at any point in the study.

In Group "A", mean age was 42.45 years (18-69 years) with Standard Deviation of 14.188. Mean weight was 72.87 kg (61 - 84 kg) with Standard Deviation of 5.806. There were 13 male and 42 female patients. Mean operating time was 40.18 minutes (15 - 60 minutes) with Standard Deviation of 8.817. Bile leak was seen in 5 patients with p value of 0.004.

In Group "B", mean age was 44.85 years (24 - 70 years) with Standard Deviation of 10.062. Mean weight was 75.53 kg (66 - 83 kg) with Standard Deviation of 4.251. There were 11 male and 44 female patients. Mean operating time was 50.91 minutes (20 - 120 minutes) with Standard Deviation of 17.614. Bile leak was seen in 17 patients with *p* value of 0.004.

The overall mean operating time was found to be 45.55 minutes. The result of the two groups was found to be statistically highly significant with a *p* value of 0.000 (less than 0.05)

DISCUSSION

Our study sample has provided us an opportunity to look into the incidence of iatrogenic gallbladder perforation in laparoscopic cholecystectomy by using two different instruments during gallbladder dissection. Our sample size was less than a study performed at USA[8] but comparable to a study performed at Netherlands[6]. The reason for comparatively smaller sample size in our setup is probably that technique of laparoscopic cholecystectomy is not that well developed as compared to developed nations and also that the inclusion criteria was narrowed only to the elective cases of cholelithiasis.

In total 20% of the patients sustained gallbladder perforation which is much less than a study[8] in which 36% patients sustained gallbladder perforation. Out of the 20% patients in our study, major cause of gallbladder perforation was electrocautery, 30.9%(n=17) that is comparable to a study that showed 40% patients sustained gallbladder perforation

Table-1: Comparison of two instruments in terms of bile leak.

			Bile Leak		Total
			No bile leak	No bile leak present	
Instrument used	Hamonic scalpel	Count % within Instrument Used % within Bile Leak	50 90.9% 56.8%	5 9.1% 22.7%	55 100.0% 50.0%
	Electrosurgical Cautery	Count % within Instrument Used % within Bile Leak	38 69.1% 43.2%	17 30.9% 77.3%	55 100.0% 50.0%
Total		Count % within Instrument Used % within Bile Leak	88 80.0% 100.0%	22 20.0% 100.0%	110 100.0% 100.0%

p-value=0.004

because of electrocautery. This may be because

Table-2: Comparison of two instruments in terms of operative time (minutes)

	N	Min	Max	Mean	Std Deviation
Group "A"	55	15	60	40.18	8.817
Group "B"	55	20	120	50.91	17.614

we included only elective cases in which there is less chance of encountering adhesions in the operating field and hilar dissection is comparatively easy whereas in the study mentioned cases with acute cholecystitis were also included in which gallbladder wall is thickened and hilar dissection is difficult which leads to more chances of iatrogenic gallbladder perforation.

After comparing two instruments, our study showed that 9.1% patients sustained gallbladder perforation while using harmonic scalpel and 30.9% patients sustained this injury by using electrocautery. These results were very much comparable to a study performed in Europe[6] that showed these figures as 16% and 50% respectively. In another study[9] 1.49% patients sustained bile leak, these figures are much better than our study probably because of the better operating facilities and presence of better expertise.

In our study, the operating time by using harmonic scalpel was much shorter (40.18minutes) as compared to that by using electrocautery (50.91 minutes). These results were comparable to two studies[6,8] that showed that harmonic scalpel gives a better haemostatic field to surgeon and also has less chances of gallbladder perforation during its dissection that helps to accomplish the procedure quickly even by the least experienced surgeons.

In our study the range of the age was 18 to 70 years that was comparable to study in which age range was 19 to 84 years. Out of the 110 patients in our study, male patients constituted 21.81% and female patients as 78.18%. These figures were comparable to a study that showed these figures as 22.69% and 77.30% respectively.

CONCLUSION

Laparoscopic cholecystectomy is one of the most frequently performed laparoscopic operations. It is now, without doubt, the procedure of choice for patients with symptomatic gallstones. The new technique rapidly gained wide acceptance and has a low rate of mortality and morbidity. A rational selection of the patients as well as a low threshold for conversion, in combination with adequate training, makes this operation a safe procedure. In experienced hands it is a safe operation with considerable benefits for the patient. The use of ultrasonic dissection in laparoscopic cholecystectomy reduces the incidence of gallbladder perforation and helps shorten the operative time. Less experienced surgeons benefit most from ultrasonic dissection, particularly in complicated intraoperative circumstances. Harmonic scalpel is not freely available in smaller surgical setups and its use is further restricted by its running cost. However, in the long run, reduced morbidity due to avoidance of gallbladder perforation along with saving of operation room time will make it ultimately cost effective.

REFERENCES

1. Russell RCG. The gall bladder and bile ducts. In: Russell RCG, Williams NS, Bulstrode CJK. (edi). Bailey & Love's Short Practice of Surgery. 24th ed. London: Arnold; 2004: 1094-113.
2. Mohiuddin K, Nizami S, Fitzgibbons RJ, Watson P, Memon B, Memon MA. Predicting Iatrogenic Gall Bladder Perforation During Laparoscopic Cholecystectomy: A Multivariate Logistic Regression Analysis of Risk Factors. ANZ J of Surg 2006; 76:130-2.
3. Aytac B, Cakar S. The outcome of gall bladder perforation during laparoscopic cholecystectomy. Acta Chir Belg 2003; 103:388-91.
4. Memon AA, Shah PS, Langah H, Ghumro AA. Early experience with laparoscopic cholecystectomy. J Surg Pakistan 2004; 9:2-5.
5. Barrat C, Champault A, Matthyssens L , Champault G. Iatrogenic perforation of the gall bladder during laparoscopic cholecystectomy does not influence the prognosis.Prospective study.Ann Chir 2004; 129:25-9.
6. Janssen IMC, Swank DJ, Boonstra O, Knipscheer BC, Klinkenbijl JHG, Goor HV. Randomized clinical trial of ultrasonic versus electrocautery dissection of the gallbladder in laparoscopic cholecystectomy. Br J Surg 2003; 90:799-803.
7. Kavlakoglu B,Pekcici R,Oral S. Clipless Cholecystectomy: which sealer should be used?World J Surg 2001; 35(4):817-23.
8. Hui TT, Giurgiu DI, Margulies DR, Takagi S, Iida A, Phillips EH.Iatrogenic gallbladder perforation during laparoscopic cholecystectomy: etiology and sequelae. Am Surg. 1999 Oct; 65(10):944-8.
9. Ioannis T, Nikolaos N, Nikolaos S, Maria C, Ioanna K, Thomas C. Complications of laparoscopic cholecystectomy: our experience in a district general hospital. Surgical Laparoscopy, Endoscopy & Percutaneous Techniques, 2009; 19(6):449-458.