COMPARISON OF HARMONIC SCALPEL WITH MONOPOLAR DIATHERMY IN DISSECTION OF GALL BLADDER FROM LIVER BED IN TERMS OF MEAN OPERATIVE TIME AND FREQUENCY OF GALL BLADDER PERFORATION IN LAPAROSCOPIC CHOLECYSTECTOMY

Muhammad Rehan Saleem, Javed Iqbal Niazi*, Omer Bin Abdul Aziz, Taseer Ibrahim*, Babar Shamim***, Mudassar Abbas Zaidi****

Scouts Hospital Wana Pakistan, *Combined Military Hospital Multan, Pakistan, **5- Mountain Medical Battalion Pakistan, ***Combined Military Hospital Peshawar Pakistan

ABSTRACT

Objective: The objective of the study was to compare the harmonic scalpel with monopolar diathermy in dissection of Gall Bladder from liver bed in terms of mean operative time and frequency of gall bladder perforation in Laparoscopic Cholecystectomy (LC).

Study Design: Randomized controlled trial.

Place and Duration of Study: Combined Military Hospital, Multan from 11th Jan 2012 to 10th Jul 2012.

Material and Methods: A total of 74 diagnosed patients of cholelithiasis undergoing LC electively fulfilling the inclusion criteria were included in the study, after taking written informed consent and approval of hospital ethics committee. They were randomly divided into two equal groups "A" and "B" of thirty seven each using computer generated tables of random numbers. Patient in Group "A" underwent LC by using harmonic scalpel for dissection of gallbladder from liver bed. In Group "B", monopolar diathermy was used for the dissection of gallbladder from its bed.

Results: A significantly higher frequency of gallbladder perforation (21.6% vs. 8.1%) and more time consumption (52.27 min vs. 45.7 min) was seen in LC by using monopolar diathermy as compared to harmonic scalpel.

Conclusion: Use of harmonic scalpel is safer in LC to avoid per operative gallbladder perforation and to complete the procedure in less time as compared to monopolar diathermy.

Keywords: Gallstones, Gallbladder perforation, Harmonic scalpel, Laparoscopic cholecystectomy, Monopolar diathermy.

INTRODUCTION

Gallstones are the most common pathology involving the biliary tract. Prevalence of gallstones ranges from 11 to 36% in general population. Women are three times more likely to develop gallstones than men, and first-degree relatives of patients with gallstones have a twofold greater prevalence. Over a 20 year period, two third of the patients remain asymptomatic. About 3% patients become symptomatic every year and 3-5% of these symptomatic patients develop complications. Two thirds of symptomatic patients present with features of chronic cholecystitis[1].

Correspondence: Dr Muhammad Rehan Saleem, P-527, Main Street, Al-Najaf Colony Faisalabad, Pakistan. (*Email: mrehansaleem@yahoo.com*)

Received: 23 Dec 2013; revised received: 24 Feb 2014; accepted: 17 Mar 2014

The classical symptom is episodic epigastric or right sub costal pain, which is constant in nature, increases in severity over first half hour of meal and lasts typically for 1 to 5 hours. It frequently radiates to right upper back or between the scapulae usually associated with nausea and vomiting. On examination, patient can be pyrexial, jaundiced and dehydrated. There is tenderness in right hypochondrium with positive Murphy's sign in acute cholecystitis. Some patients may present with guarding, rigidity and a palpable mass. But most of the patients remain asymptomatic and gallstones are found only incidentally. The standard recommendation for asymptomatic stones is only expectant management[2].

Cholecystectomy is the treatment of choice for symptomatic gallstones because it removes the organ that contributes to both the formation of gallstones and the complications ensuing from them. Cholecystectomy can be done either

by open method or laparoscopically. LC is now the gold standard procedure for symptomatic gallstones[3].

LC is associated with a number of complications such as gallbladder perforation, bleeding and cardiac arrhythmias despite many advantages[4]. Perforation is a common complication which occurs due to traction, grasping and dissection of the gallbladder. Morbidity after iatrogenic gallbladder perforation can be avoided by complete removal of gallstones spilled and local irrigation of the area, and antibiotic cover[5].

Despite its high initial cost, the advantage of harmonic scalpel is that operating time is significantly shorter, and risk of iatrogenic injury is reduced as compared to monopolar diathermy[6].

The purpose of this study was to evaluate two commonly used techniques of tissue dissection in gall bladder bed comparing harmonic scalpel and monopolar diathermy in terms of operative time and gall bladder perforation.

MATERIAL AND METHODS

These randomized controlled trials were carried out at CMH Multan from 11th Jan 2012 to 10th Jul 2012. Patients of both genders planned for elective LC with gall stone disease confirmed on ultrasound abdomen between the age of 15-60 years without any co-morbidities such as Diabetes mellitus, Ischemic heart disease and coagulopathy, were enrolled in the study after taking written informed consent and approval of Hospital ethical committee. Patients with acute cholecystitis, dilated common bile duct, previous history of jaundice and previous upper abdominal surgery were excluded from the study. Seventy four patients were included in the study through consecutive sampling. They were divided into two groups "A" and "B" of thirty seven each by using random numbers table. Hospital registration number, name, age, gender, address and phone number (optional) were noted. Group A underwent LC by using harmonic scalpel (Ethicon endosurgery, Minimum 30000 Hz and Maximum 50000 Hz) for dissection of gall bladder from its bed. Group B underwent LC by using monopolar diathermy {Geister ESU-X 350, Cutting (30) = Blend mode and Coagulation (30) = Soft mode; using "L" shaped Hook and foot control} for dissection of gallbladder from its bed. Patients were prepared for surgery after taking a detailed history, a thorough physical examination and investigations necessary for anesthesia assessment. They were admitted one day before the operation. All operations were performed under general anaesthesia by the same surgical team. Patients were discharged depending upon the individual response.All the information was recorded on a specially designed Performa.

The data had been analyzed using SPSS version 12. Mean and Standard Deviations (SD) were calculated for quantitative variables like age and operative time. Qualitative variables like gender and Gall bladder perforation were described using frequencies and percentages. Independent samples' t-test was used to compare the age and operative time between two groups. Chi-square test was used to compare the gender and frequency of

Table-1: Comparison of gall bladder perforation between the two group.

Gall bladder perforation	Group A (n=37)	Group B (n=37)
No perforation	34 (91.9%)	29 (78.4%)
Perforation	3 (8.1%)	8 (21.6%)

p = 0.004

Table-2: Comparison of operating time between the two groups.

Group	Mean operative time (min)
Group A (n=37)	45.70 + 2.737
Group B (n=37)	52.27 + 4.401

p = 0.01

gallbladder perforation betwen two groups. A *p*-value <0.05 was considered significant.

RESULTS

Total 74 patients were included in the study. None of the patients was dropped out or lost at any point in the study.The age distribution ranged from 21-68 years in the study. Mean age in Group A was 42.81 ± 11.578 years. Mean age in Group B was 46.68 ± 12.304 years (*p*= 0.168). Group A had 8.1% males and 91.9% females. Group B had 27% males and 73% females (*p*=0.033). There were 8.1% (n=3) patients in group A, who had gall bladder perforation as compared with 21.6% (n=8) patient in Group B with a statistically significant difference (*p*= 0.004) (table-1).

Mean operative time in group A was 45.70 ± 2.737 minutes while in group B, it was noted to be 52.27 ± 4.401 minutes (*p* = 0.01) (table–2).

DISCUSSION

In total 14.9% of the patients sustained gallbladder perforation which is much less than a study done by Ioannis T et al[7]in which 36% patients sustained gallbladder perforation. Out of the 14.9% patients in our study, major cause of gallbladder perforation was monopolar diathermy, 21.7% (8 patients) that is much lesser than 40% patients sustaining gallbladder perforation because of monopolar diathermy in another study. This difference is because of the reason that we included only elective cases in which there is less chance of encountering adhesions in the operating field, hilar dissection is comparatively easy because of intact anatomy and more time taken for careful dissection. Whereas in the study mentioned, cases with acute cholecystitis were also included in which gallbladder wall is thickened and hilar dissection is difficult. Difficult dissection leads to frequent per operative gallbladder perforations.

Our results were very much comparable to a study performed in Europe by Janssen et al[8]that showed only 16% patient sustaining gall bladder perforation compared to 14.9% perforation in our study. In another study[7], only 1.49% patients sustained bile leak. These figures are much better than our study probably because of the better operating facilities, experienced hands and improvement in the field of LC over the years. Similarly, Kandill T et al reported gallbladder rate to be 7.1% with harmonic scalpel and 18.6% with the monopolar diathermy[9]. These results are also comparable with our study (8.1% with harmonic scalpel and 21.6% with monopolar diathermy)

In our study, the operating time by using harmonic scalpel was much shorter (45.70 minutes) as compared to that by monopolar diathermy (52.27 minutes). These results are comparable to two studies[8,10] that showed that harmonic scalpel lets the surgeon accomplish surgery quicker as compared to monopolar diathermy by providing good haemostatic field. Chances of gallbladder perforation during dissection are also reduced.

In our study the range of the age was 18 to 70 years that was comparable to Bessa SS et al[11] in which age range was 19 to 84 years. Out of the 74 patients in our study, male patients constituted 17.56% and female patients as 82.44%. These figures were comparable to a study that showed these figures as 22.69% and 77.30% respectively[11,12].

CONCLUSION

The use of ultrasonic harmonic scalpel dissection in LC reduces the chances of gallbladder perforation helping the operation to progress. Since LC has a longer learning curve and needs good eye-hand coordination, less experienced surgeons benefit most from ultrasonic dissection, particularly in complicated operative circumstances. Although initial cost of harmonic scalpel is more than monopolar diathermy.

CONFLICT OF INTEREST

The authors of this study reported no conflict of interest.

REFERENCES

1. Seymour I S. Gall bladder and extrahepatic biliary system. In: Burnicardi FC, Dana KA, Timothy RB, David LD, John GH, Raphael EP, (ed) Schwartz's Principles of surgery. 8th ed. McGraw-Hill, 2005: 1136-37.
2. Russell RCG. The gall bladder and bile ducts. In: Russell RCG, Williams NS, Bulstrode CJK. (ed). Bailey & Love's Short Practice of Surgery. 24th ed. London: Arnold; 2004: 1094-113.

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. 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. Endosc & Percutaneous Tech. 2009; 19: 449-58.
8. Janssen IMC, Swank DJ, Boonstra O, Knipscheer BC, Klinkenbijl JHG, Van Goor H. Randomized clinical trial of ultrasonic versus electrocautery dissection of the gallbladder in laparoscopic cholecystectomy. BJS. 2003; 90: 799 – 803.
9. Kandil T, El Nakeeb A, El Hefnawy E. Comparative study between clipless laparoscopic cholecystectomy by harmonic scalpel versus conventional method: a prospective randomized study. J Gastrointest Surg. 2010; 14(2): 323-8.
10. Hui TT, Giurgiu DI, Margulies DR, Takagi S, Lida A, Phillips EH. Iatrogenic gallbladder perforation during laparoscopic cholecystectomy: etiology and sequelae. Am Surg. 1999; 65: 944.
11. Bessa SS, Al-Fayoumi TA, Katri KM, Awad AT. Clipless laparoscopic cholecystectomy by ultrasonic dissection. J Laparoendosc Adv Surg Tech A. 2008; 18: 593-86.
12. Duttaroy DD, Jitendra J, Duttaroy B, Bansal U, Dhameja P, Patel G. Management strategy for dirty abdominal incisions: primary or delayed primary closure? A randomized trial. Surg Infect (Larchmt). 2009; 10: 129-36.