ORIGINAL ARTICLE

Comparison of Incidence of Gallbladder Perforation in Laparoscopic Cholecystectomy with Harmonic Scalpel Vs Electrocautery

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ABSTRACT

Aim: To compare the incidence of gall bladder perforation during laparoscopic cholecystectomy with conventional electrocautery versus harmonic scalpel.
Study design: Randomized controlled trial
Place and duration of study: 6 month Department of surgery, Multan Medical and Dental College, Ibne Siena Hospital and Research Institute Multan
Methods: One hundred and twenty four cases of gallstone disease were registered who fulfilled the inclusion criteria. The allocation of cases to two study groups was allocated with envelop method. Patients in group A underwent Harmonic assisted laparoscopic cholecystectomy and those in group B had electrocautery assisted cholecystectomy.
Results: The average age of all patients was 47.60±12.28 years. There were 47 (37.9%) males and 77 (62.09%) female patients in this study. Gall bladder perforation was present in 4(6.4%) cases in Group A while 9(14.5%) cases in Group B.
Conclusion: Harmonis assisted laparoscopic cholecystectomy is safe in terms of lower incidence of gall Bladder perforation.
Keywords: Laparoscopic cholecystectomy, harmonic assisted, electrocautery assisted

INTRODUCTION

The advantages of laparoscopic cholecystectomy (LC) have been published extensively, and LC has become the gold standard in treating benign gallbladder diseases[1,2]. The most accepted technique was outlined by Reddick and Oslen, and has been extensively described in literature. Pneumoperitonium is created by insufflating carbon dioxide gas at pressure less than 15mm of Hg by using Verre's needle. Four different ports are used to deal hepatobiliary structure. Cystic artery and cystic duct are ligated after careful dissection. Then gall bladder is dissected from liver bed. Gall bladder is removed via umbilical port to complete the procedure.[3]

The ultrasonically activated Harmonic scalpel (HS) was introduced into clinical use nearly decade ago as an alternative to electrocautary for the haemostatic dissection of tissues. Increasing use of this instrument attests to its ability to aid safe, careful dissection with less bleeding and viscus damage than accompanies diathermy dissection. This innovative method of cutting tissue works by transforming electrical energy into mechanical energy[4]. The mechanical energy is passed through disposable element, often a hook or clip, which vibrate at 55.5 KHz 4rcs[4,5]. Ultrasonic scalpel causing three effects that act synergically: cavitations, coaptation/ coagulation, and cutting. The lateral energy spread is minimal, and the risk of distant tissue damage is lower than that of electrosurgery[4]. Vessel and duct up to size of 2 mm in diameter can be safely divided.[6] Moreover, ultrasonic scalpel contributes to have a more clean and clear (smokes-free) field of operation and it reduces the operative time, the bleeding and the costs of the operation without an increase of the complications and of the percentages of 'open' conversion, and perhaps leads to a less negative influence on the postoperative systemic immune response[7].

A real advantage of this equipment is that it reduces the number of instruments change during an operation, such as hemostats, staples, scissors & ligatures. It reduces the time spent in dissection[6,7] Instrumental failure remains a preventable cause of conversion from laparoscopy to open cholecystectomy[8]. Ultrasonic shear is multifunctional instrument facilitating precise cutting with minimum lateral damage. It does not use electricity, with all its potential risks.

Still the problem of gall bladder perforation and bile spillage in peritoneal cavity during dissection from liver bed is common. A gross difference in incidence of gall bladder perforation has been observed in both techniques. One study conducted in Alexandria included group A (60 patients) in whom laparoscopic cholecystectomy was done using the traditional method by clipping both cystic duct and artery and dissection of gall bladder from liver bed by

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diathermy , and group B (60 patients) laparoscopic cholecystectomy was conducted using harmonic scalpel closure and division of both cystic duct and artery and dissection of gall bladder from liver bed by harmonic scalpel. The incidence of gallbladder perforation was statistically significantly higher in the electrocautry group, compared to the HS group (30 vs. 10%, respectively; P=0.002)[9]. In another study there is also significantly less incidence of gallbladder peroration in HS as compared to electrocautry (7.1% vs. 18.6, respectively p = 0.04)[10].

As the incidence of gall bladder perforation in gall bladder dissection during laparoscopic cholecystectomy with harmonic scalpel and electrocautry is different in different studies and no local data is available on the subject that could document safety of one method over the others. The results of this study will help healthcare professionals to develop guidelines for using the better option.

MATERIAL AND METHODS

After approval from local ethics committee, 124 patients presenting in the surgical unit III undergoing laparoscopic cholecystectomy randomized into group A and B, each group comprising 62 patients on the basis of envelop with assign treatment picked up by the patient. The demographic information like name, age, sex and address recorded. An informed consent taken from the patient. Group A subjected to harmonic assisted laparoscopic cholecystectomy and Group B subjected to electrocautery assisted laparoscopic cholecystectomy. Operative procedure carried out by the Professor, Associate Professor of the surgery Department and researcher was part of operating team.Gall Bladder perforation (Yes/No) noticed by the researcher preoperatively and labeled as per operational definition.

The collected information entered and analyzed through SPSS version 10.Descriptive statistics used to calculate mean and standard deviation for age. Frequencies and percentages calculated for Gender and Gall bladder perforation (Yes/No) in two groups. Chi Square test applied to compare the incidence of gall bladder perforation between two groups. P-value equal or less than 0.05 (P≤0.05)taken as significant. Stratification undertaken on age and Gender to study the effect of these variables on study and post straitification Chi Square test applied to see the significant difference.

RESULTS

In this study there were 124 patients which were equally divided into two Groups i.e. 62 patients were treated in Group A (harmonic assisted Laparoscopic Cholecystectomy) and rest of the 62 patients were treated in Group B (Electrocautry assisted Laparoscopic Cholecystectomy). The average age of patients in Group A was 48.07±12.94 years and the average age of patients in Group B was 47.14±11.58 years. Overall the average age of all patients was 47.60±12.28 years. The minimum and maximum ages were 14-70 years respectively (Table 1). According to table3; there were 47 (37.9%) males in which 22 were treated in Group A and 25 were treated in Group B. There were 77(62.09%) female patients in which 40 were treated in Group A and 37 were treated in Group B (Table 2). Gall bladder perforation was found in 4(6.4%) case in Group A as compared to 9(14.5%) case in Group B (Table 3). Effects of confounding variable straitified and it was found that confounding variables have no statistically significant effect on outcome.

Table 1: Descriptive statistics of age in study groups

	Group A	Group B	Total
Mean	48.07	47.14	47.60
Std. Deviation	12.943	11.580	12.278
Minimum	14	14	14
Maximum	70	70	70

Table 2: Frequency of gender in study groups

Gender	Group A	Group B	Total
Male	22(35.4%)	25 (40.32%)	47(37.9%)
Female	40(64.5%)	37 (59.67%)	77(62.09%)
Total	62 (50%)	62 (50%)	124 (100%)

Table 3: Frequency of gallbladder perforation

Gall Bladder Perforation	Group A	Group B
Yes	4(6.4%)	9(14.5%)
No	58(93.54%)	53(85.48%)

P value=0.034

DISCUSSION

Laparoscopic cholecystectomy with all its advantages, has almost replaced open cholecystectomy in those with uncomplicated gallstone disease. During laparoscopic cholecystectomy various methods of cutting and coagulation are used, but at present,monopolar electrocautery is the preferred cutting method for laparoscopic surgery[11]. The use of monopolar electrocautery is often associated with inadvertent tissue injury, as it generates intense collateral heat leading to tissue necrosis and ischemia. Most electrocautery injuries go unrecognized during surgery or present late[11]. But injury such as gallbladder perforation during laparoscopic cholecystectomy may greatly hinder the surgical procedure by leading to inevitable spillage of bile and stones into the peritoneal cavity. This may prolong the surgical procedure and have serious consequences[12].

Unlike monopolar electrocautery, ultrasonic dissection instrumentation denatures protein by means of ultrasonic vibrations at a frequency of 55 500 Hz with a vibratory excursion of 50–100ìm[13]. The vibration transfers mechanical energy to the tissue, resulting in simultaneous cutting and coagulation. The vibrating ultrasonic dissector produces a coagulum of denatured protein and blood clot that occludes adjacent blood vessels and reduces bleeding. Vibration of the dissector scalpel blade does not generate as much heat as monopolar cautery or laser cautery, and the vibration in potential spaces results in cavitations, which may facilitate tissue dissection[13]. No smoke is generated, only microaromized water droplets are produced, and no electric current is detected in the surgical field; therefore, this cutting method is also safe for use in patients with implanted pacemakers.[14] The mist produced by the harmonic scalpel is rapidly absorbed by the peritoneal surface, and it does not require suctioning or releasing the smoke that is produced during monopolar electrocautery dissection.

Gallbladder perforation is reported to be the most frequent complication occurring intraoperatively during laparoscopic cholecystectomy.[15] Perforation occurs in 13%–50% of patients who undergo laparoscopic cholecystectomy, and in 10%–40% of these patients, bile leakage and stone spillage are present.[16] Laceration due to grasper traction and electrocautery dissection is the most common mechanism of gallbladder rupture during laparoscopic cholecystectomy[17].

In my study, I compared the gall bladder perforation of laparoscopic cholecystectomy with harmonic scalpel and electrocautry. Gall Bladder perforation during laparoscopic cholecystectomy leading to bile leak into the peritoneal cavity confirmed preoperatively and gall bladder perforation was found in 4(6.4%) cases in Harmonic scalpel Group as compared to 9(14.5%) cases in electrocautry Group .

Similar study was conducted by Nakeeb[18] A suggested The Harmonic scalpel provides complete hemobiliary stasis and is a safe alternative to the standard clipping of the cystic duct and artery with incidence of gallbladder peroration was lower in the HS group (10% vs. 18.3%; p=0.03) comparable with our study. More or less similar results shown in other studies [9,10]

CONCLUSION

Ultrasonic dissection is safe and effective as it provides a superior alternative to the currently used high frequency monopolar technology in terms of a lower incidence of gallbladder perforation.

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