

ORIGINAL RESEARCH

Comparison of monopolar electrocautery and ultrasonic dissection of gallbladder in laparoscopic cholecystectomy

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Received: 13 February, 2023

Accepted: 17 March, 2023

ABSTRACT

Background: Laparoscopic cholecystectomy is the “gold standard” for treatment of symptomatic gallstone disease. The present study was conducted to compare monopolar electrocautery and ultrasonic dissection of gallbladder in laparoscopic cholecystectomy. **Materials & Methods:** 48 patients undergoing laparoscopic cholecystectomy of both genders were divided into 2 groups of 24 each. In group I, monopolar electrocautery was used and in group II, ultrasonic dissection of the gall-bladder was performed using Harmonic Ace curved shears. Parameters such as presenting symptoms, comorbidities, previous abdominal surgeries, complications were recorded. Outcomes in the electrocautery and ultrasonic dissection groups was also recorded. **Results:** Group I had 14 males and 10 females and group II had 13 males and 11 females. Common presenting symptoms were pain abdomen seen in 15 in group I and 9 in group II, heart burn in 7 in group I and 5 in group II and dyspepsia in 9 in group I and 7 in group II. The mean duration of surgery was 34.2 minutes in group I and 26.4 minutes in group II. Previous abdominal surgeries was seen in 3 and 4, comorbidities in 5 and 2 and complications in 7 and 13 in group I and II respectively. The difference was significant ($P < 0.05$). Ultrasonography findings was distended gallbladder in 20 and 19, gallbladder wall thickness > 3 mm in 5 and 3, single calculus in 12 and 10, multiple calculi in 7 and 8, sludge in 5 and 6 and stone size > 1 cm was in 4 and 5 in group I and group II respectively. Outcome was gallbladder perforation seen in 8 and 3, bile leak in 5 and 2, stone spillage in 3 and 1 and lens cleaning in 2 and 0 respectively. **Conclusion:** Ultrasonic dissection is safe and effective method in patient undergoing Laparoscopic cholecystectomy. It reduces the incidence of gallbladder perforation.

Key words: electrocautery, Laparoscopic cholecystectomy, ultrasonic dissection

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INTRODUCTION

Laparoscopic cholecystectomy (LC) is very commonly performed for removal of gallstones. Laparoscopic cholecystectomy is the “gold standard” for treatment of symptomatic gallstone disease.¹ Gallbladder perforation during dissection from the liver bed with spillage of bile and loss of stones in the peritoneal cavity is a common operative problem during laparoscopic cholecystectomy. The incidence of gallbladder perforation during laparoscopic cholecystectomy has been reported to be 20%–40%.²

During surgery, gallbladder perforation with spillage of bile and loss of stones disrupts the flow of surgery and prolongs its duration. At present, monopolar

electrocautery is the main cutting method used for gallbladder dissection from the liver bed.³ It is associated with local thermal and distant tissue damage, which might cause inadvertent perforation of the gallbladder during gallbladder bed dissection. Ultrasonic and electro-surgical energy dissectors are commonly used dissection devices during LC. These high energy devices are used during surgical procedures to reduce blood loss intraoperatively and at the same time used to cut/coagulate, desiccate or fulgurate the tissues.⁴ The conventional electrocautery uses electrical current for achieving these goals during surgery either open or laparoscopic. Ultrasonic dissection of the gallbladder bed during laparoscopic cholecystectomy has the potential to improve the

quality of surgery by decreasing the incidence of gallbladder perforation and its intraoperative consequences.⁵The present study was conducted to compare monopolar electrocautery and ultrasonic dissection of gallbladder in laparoscopic cholecystectomy.

MATERIALS & METHODS

The present study comprised of 48 patients undergoing laparoscopic cholecystectomy of both genders. All patients agreed to participate in the study. Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 24 each. In

group I, monopolar electrocautery was used and in group II, ultrasonic dissection of the gall-bladder was performed using Harmonic Ace curved shears. All patients underwent successful completion of laparoscopic cholecystectomy. Parameters such as presenting symptoms, comorbidities, previous abdominal surgeries, complications were recorded. outcomes in the electrocautery and ultrasonic dissection groups was also recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I: Distribution of patients

Groups	Group I (24)	Group II(24)
Method	monopolar electrocautery	ultrasonic dissection
M:F	14:10	13:11

Table I shows that group I had 14 males and 10 females and group II had 13 males and 11 females.

Table II: Assessment of parameters

Parameters	Variables	Group I	Group II	P value
Presenting symptoms	Pain abdomen	15	9	0.87
	Heart burn	7	5	
	Dyspepsia	9	7	
Duration of surgery (mins)		35.2	26.4	0.05
previous abdominal surgeries		3	4	0.92
comorbidities		5	2	0.04
complications		7	13	0.01

Table II shows that common presenting symptoms were pain abdomen seen in 15 in group I and 9 in group II, heart burn in 7 in group I and 5 in group II and dyspepsia in 9 in group I and 7 in group II. The mean duration of surgery was 34.2 minutes in group I

and 26.4 minutes in group II. Previous abdominal surgeries was seen in 3 and 4, comorbidities in 5 and 2 and complications in 7 and 13 in group I and II respectively. The difference was significant (P< 0.05).

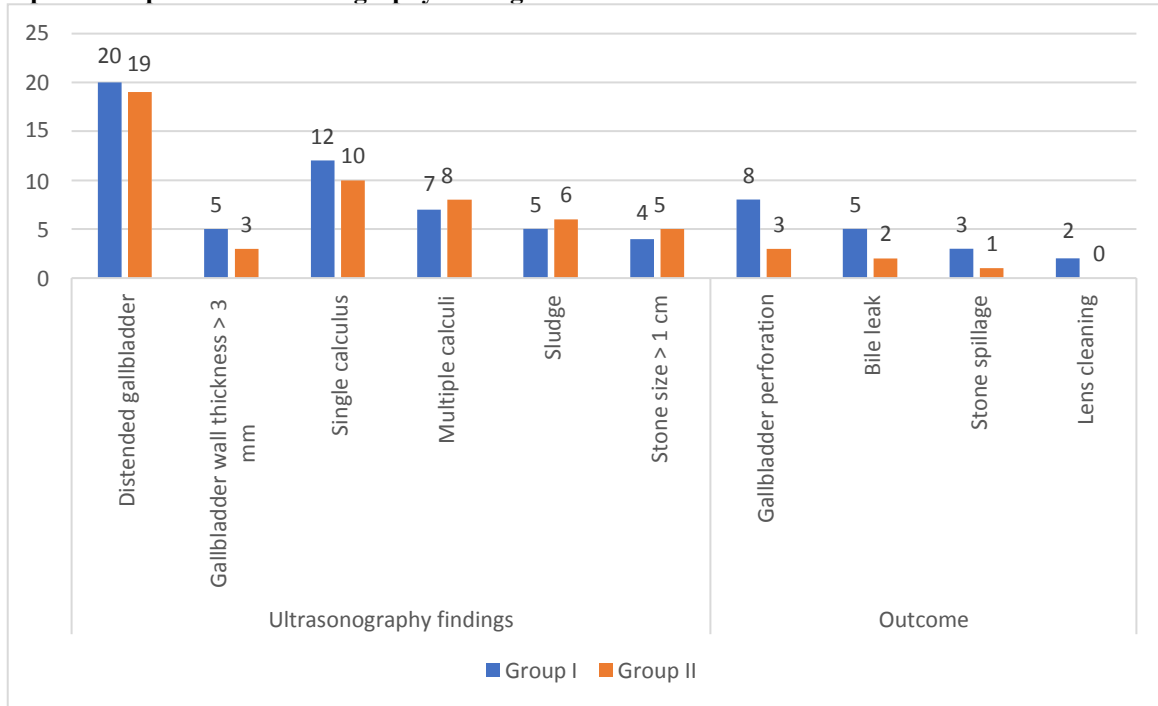
Table III: Preoperative ultrasonography findings and outcome

Parameters	Variables	Group I	Group II	P value
Ultrasonography findings	Distended gallbladder	20	19	0.94
	Gallbladder wall thickness > 3 mm	5	3	0.05
	Single calculus	12	10	0.52
	Multiple calculi	7	8	
	Sludge	5	6	
Stone size > 1 cm		4	5	0.98
Outcome	Gallbladder perforation	8	3	0.01
	Bile leak	5	2	
	Stone spillage	3	1	
	Lens cleaning	2	0	

Table III, group I shows that ultrasonography findings was distended gallbladder in 20 and 19, gallbladder wall thickness > 3 mm in 5 and 3, single calculus in 12 and 10, multiple calculi in 7 and 8, sludge in 5 and 6 and stone size > 1 cm was in 4 and 5 in group I and

group II respectively. Outcome was gallbladder perforation seen in 8 and 3, bile leak in 5 and 2, stone spillage in 3 and 1 and lens cleaning in 2 and 0 respectively.

Graph I: Preoperative ultrasonography findings and outcome



DISCUSSION

Laparoscopic cholecystectomy is the standard of care for patients with symptomatic gallstone disease. This technique, with all its advantages, has almost replaced open cholecystectomy in those with uncomplicated gallstone disease.⁶ During laparoscopic cholecystectomy various methods of cutting and coagulation are used, but at present, monopolar electrocautery is the preferred cutting method for laparoscopic surgery.⁷ Ultrasonic dissectors are new addition in the instruments for laparoscopic procedures, and perform dissection and ligation of vessels by coaptation and cavitation.⁸ In routine, ultrasonic devices are used for laparoscopy involving the deeper operating fields, while electro-surgical devices are preferred for LC. However, nowadays ultrasonic dissectors have also started being used during routine LC procedures.⁹ The present study was conducted to compare monopolar electrocautery and ultrasonic dissection of gallbladder in laparoscopic cholecystectomy.

We found that group I had 14 males and 10 females and group II had 13 males and 11 females. Mahabaleshwar et al¹⁰ determined the incidence of gallbladder perforation and its intraoperative consequences. Patients were randomly assigned before administration of anesthesia to electrocautery or ultrasonic dissection. Both groups were compared for incidence of gallbladder perforation during dissection, bile leak, stones spillage, lens cleaning, duration of surgery and estimation of risk of gall-bladder in the presence of complicating factors. The overall incidence of gallbladder perforation was 28.3% (40.0% in the electrocautery v. 16.7% in the ultrasonic dissection group, p = 0.045). Bile leak occurred in

40.0% of patients in the electrocautery group and 16.7% of patients in ultrasonic group (p = 0.045). Lens cleaning time (p = 0.015) and duration of surgery (p = 0.001) were longer in the electrocautery than the ultrasonic dissection group. There was no statistical difference in stone spillage between the groups (p = 0.62).

We found that common presenting symptoms were pain abdomen seen in 15 in group I and 9 in group II, heart burn in 7 in group I and 5 in group II and dyspepsia in 9 in group I and 7 in group II. The mean duration of surgery was 34.2 minutes in group I and 26.4 minutes in group II. Previous abdominal surgeries was seen in 3 and 4, comorbidities in 5 and 2 and complications in 7 and 13 in group I and II respectively. Anis et al¹¹ compared the surgical outcomes of ultrasonic dissector over conventional electrocautery in patients planned for LC. In group A (n=100), patients were operated through three-port standard laparoscopic cholecystectomy and conventional electro-surgical cautery was used for dissection. While in group B (n=50), patients were operated through single incision laparoscopic surgery (SILS) and Harmonic dissector was used for sealing of cystic artery and cystic duct. Complications between electrocautery and ultrasonic dissector were compared. Out of 150 patients planned for laparoscopic cholecystectomy, 33 (22%) were males and 117 (78%) females. The mean age was 40±6.45 years with an age range of 12-80 years. In group A, intraoperative gall bladder perforation was found in 5 patients whereas in group B, there was only one patient with perforation. A total of 4 cases were converted to open cholecystectomy in group A due to difficult dissection in Calot’s triangle as compared to

1 case in group B. In group A, 3 cases had postoperative bile leakage in the drain. In two patients it settled over a period of 3 days. About 03 cases had wound infection in group A and 1 in group B. Mean operative time in group A was 42.2 ± 8.93 minutes versus 35.7 ± 4.85 minutes in group B.

We found that ultrasonography findings was distended gallbladder in 20 and 19, gallbladder wall thickness > 3 mm in 5 and 3, single calculus in 12 and 10, multiple calculi in 7 and 8, sludge in 5 and 6 and stone size > 1 cm was in 4 and 5 in group I and group II respectively. Outcome was gallbladder perforation seen in 8 and 3, bile leak in 5 and 2, stone spillage in 3 and 1 and lens cleaning in 2 and 0 respectively. Ali et al¹² compared the incidence of gall bladder perforation during laparoscopic cholecystectomy with conventional electrocautery versus harmonic scalpel. 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.

The limitation the study is small sample size.

CONCLUSION

Authors found that ultrasonic dissection is safe and effective method in patient undergoing Laparoscopic cholecystectomy. It reduces the incidence of gallbladder perforation.

REFERENCES

1. Devassy R, Hanif S, Krentel H, Verhoeven HC, Torres-de la Roche LA, De Wilde RL. Laparoscopic ultrasonic dissectors: technology update by a review of literature. *Med Devices (Auckl)*. 2019; 12:1.
2. Park AE, Mastrangelo Jr MJ, Gandsas A, Chu U, Quick NE, editors. *Laparoscopic dissecting instruments*. *Semin Laparosc Surg*. 2001; 8(1): 42-52.
3. Sanawan E, Qureshi AU, Qureshi SS, Cheema KM, Cheema MA. Effectiveness of Ultrasound Shear for Clipless Laparoscopic Cholecystectomy Versus Conventional Unipolar Electrocautery in Patients with Cholelithiasis. *J Coll Phys Surg Pak*. 2017; 27(10):00.
4. Ramzanali SA, Shah SSH. Monopolar electrocautery versus ultrasonic dissection of the gallbladder from the gallbladder bed in laparoscopic cholecystectomy. *J Ayub Med Coll Abbottabad*. 2013; 25(3-4): 16-8.
5. 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.
6. Shabbir A, Hussain S. Comparison of Gallbladder Perforation During Dissection from Liver Bed in Patients Undergoing Monopolar Electrocautery with Those Undergoing Ultrasonic Dissection during Lap. Cholecystectomy. *Pak J Med Health Sci*. 2016; 10(4): 1390- 2.
7. 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; 14:323-8.
8. Tucker RD. Laparoscopic electro-surgical injuries: survey results and their implications. *SurgLaparoscEndosc*. 1995;5:311-7.
9. Lee SJ, Park KH. Ultrasonic energy in endoscopic surgery. *Yonsei Med J*. 1999;40:545-9.
10. Mahabaleshwar V, Kaman L, Iqbal J, Singh R. Monopolar electrocautery versus ultrasonic dissection of the gallbladder from the gallbladder bed in laparoscopic cholecystectomy: A randomized controlled trial. *Canadian journal of surgery*. 2012 Oct;55(5):307.
11. Anis SB, Rehman PM, Ahmad F, Farooq U. Comparative Study of Conventional Electrocautery Versus Ultrasonic Dissector in Laparoscopic Cholecystectomy. *Journal of Islamabad Medical & Dental College*. 2019 Jun 27;8(2):70-3.
12. Ali M, Akbar A, Khan MUR, Ullah MH. Comparison of incidence of gallbladder perforation in laparoscopic cholecystectomy with harmonic scalpel vs electrocautery. *Pak J Med Health Sci*. 2015; 9(2): 511-3.