Section: Research Paper

A comparitive study of monopolar electrocautery versus ultrasonic dissection of gallbladder in laparoscopic cholecystectomy

[1]Dr. Sai Vishwas, [2]Dr. H.V Nerlekar, [3]Dr. Pallavi Prakash

[1,3]Resident, [2]Associate Professor, Department of General Surgery, Krishna Vishwa Vidhyapeeth, Karad, Maharashtra, India

Corresponding author: Dr. Sai Vishwas, Resident, Department of General Surgery, Krishna Vishwa Vidhyapeeth, Karad, Maharashtra, India **Email:** vishucool.a17@gmail.com

ABSTRACT

Background: Laparoscopic cholecystectomy is the standard of care for patients with symptomatic gallstone disease. The present study compared monopolar electrocautery and ultrasonic dissection of gallbladder in laparoscopic cholecystectomy.

Materials & Methods:56 patients undergoing laparoscopic cholecystectomy of both genders were divided into 2 groups of 28 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 14 females and group II had 13 males and 15 females. The mean duration of surgery was 36.2 minutes in group I and 27.4 minutes in group II. Previous abdominal surgeries were seen in 2 and 3, comorbidities in 4 and 1 and complications in 6 and 10 in group I and II respectively. The difference was significant ($P< 0.05$).

Conclusion: Ultrasonic dissection reduces the incidence of gallbladder perforation. It is safe and effective method in patient undergoing laparoscopic cholecystectomy.

Key words: Laparoscopic cholecystectomy, ultrasonic dissection

Introduction

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.[1]

The introduction of Harmonic scalpel (HS) has been a breakthrough for it made the laparoscopic surgery much smoother and attractive.[2] Furthermore, it has also alleviated the fear associated with the use of mono-polar-electrocautery (MEC). Harmonic scalpel works by cutting and coagulating at the same time.[3] It also eliminates the inadvertent electrical arching injury caused by lateralization of thermal energy which are associated with the use of electrocautery making HS a potentially safer instrument for tissue dissection.[4]During laparoscopic cholecystectomy various methods of cutting and coagulation are used, but at present, monopolar electrocautery is the preferred cutting method for laparoscopic surgery. Ultrasonic dissectors are new addition in the instruments for laparoscopic procedures, and perform dissection and ligation of vessels by coaptation and cavitation.In routine, ultrasonic devices are used for laparoscopy involving the deeper operating fields, while electrosurgical devices are preferred for LC. However, nowadays ultrasonic dissectors have also started being used during routine LC procedures.[5]The present study compared monopolar electrocautery and ultrasonic dissection of gallbladder in laparoscopic cholecystectomy.

Materials & Methods

The present study comprised of 56 patients selected for laparoscopic cholecystectomy of both genders. All patients gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 28 each. In group I, monopolar electrocautery was used and in group II, ultrasonic dissection of the gall-bladder was performed. Parameters such as presenting symptoms, comorbidities, previous abdominal surgeries, complications were recorded. Outcomes in the electrocautery and ultrasonic dissection groups were 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 (28)	Group II (28)
Method	monopolar electrocautery	ultrasonic dissection
M:F	14:14	13:15

Table I shows that group I had 14 males and 14 females and group II had 13 males and 15 females.

Table II Assessment of parameters

Parameters	Group I	Group II	P value
Duration of surgery (mins)	36.2	27.4	0.03
Previous abdominal surgeries	2	3	0.95
comorbidities	4	1	0.05
complications	6	10	0.02

Table II, graph I shows that the mean duration of surgery was 36.2 minutes in group I and 27.4 minutes in group II. Previous abdominal surgeries were seen in 2 and 3, comorbidities in

4 and 1 and complications in 6 and 10 in group I and II respectively. The difference was significant (P< 0.05).

Graph IAssessment of parameters

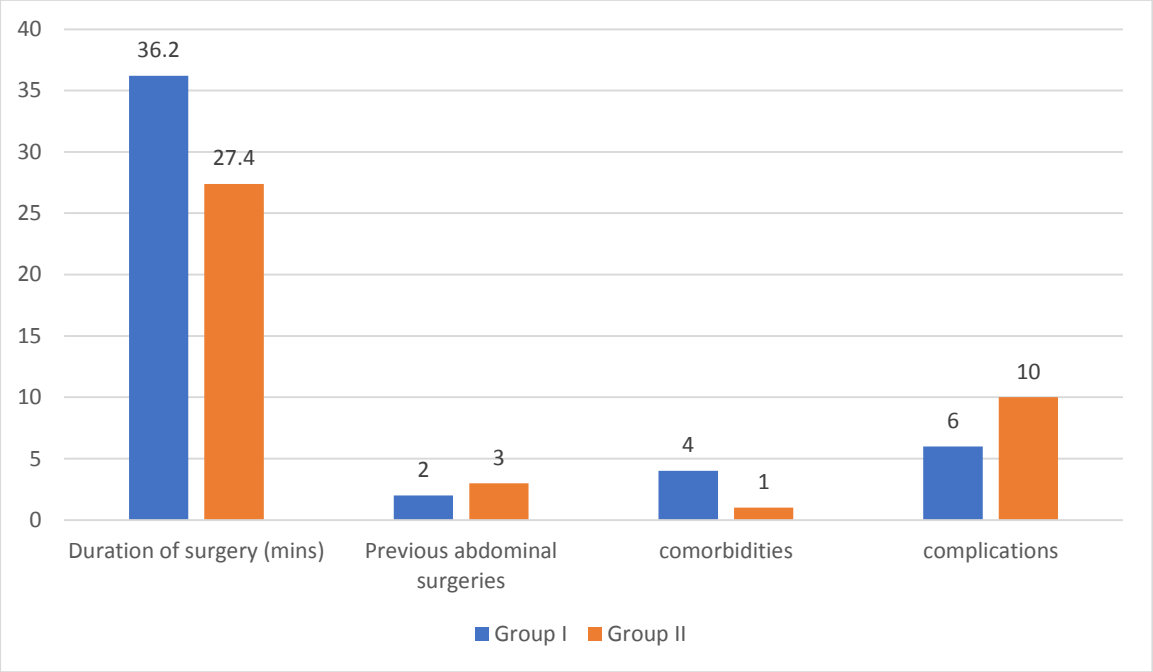

Table III Preoperative ultrasonography findings and outcome

Parameters	Variables	Group I	Group II	P value
Presenting symptoms	Heart burn	16	10	
	Pain abdomen	8	6	
	Dyspepsia	10	8	
Ultrasonography findings	Distended gallbladder	21	19	0.83
	Gallbladder wall thickness > 3 mm	7	9	0.05
	Single calculus	15	12	0.52
	Multiple calculi	7	7	
	Sludge	6	9	
Stone size > 1 cm		5	6	0.98
Outcome	Bile leak	4	3	
	Stone spillage	2	1	
	Gallbladder perforation	7	4	
	Lens cleaning	1	0	

Table IIIshows that common presenting symptoms were pain abdomen seen in 16 in group I and 10 in group II, heart burn in 8 in group I and 6 in group II and dyspepsia in 10 in group I and 8 in group II. Ultrasonography findings was distended gallbladder in 21 and 19, gallbladder wall thickness > 3 mm in 7 and 9, single calculus in 15 and 12, multiple calculi in 7 and 7, sludge in 6 and 9 and stone size > 1 cm was in 5 and 6 in group I and group II

respectively. Outcomewas bile leak in 4 and 3, stone spillage in 2 and 1, gallbladder perforation seen in 7 and 4 and lens cleaning in 1 and 0 in group I and II respectively. The difference was significant ($P< 0.05$).

Discussion

Laparoscopic cholecystectomy (LC) is very commonly performed for removal of gallstones.Laparoscopic cholecystectomy is the "gold standard" for treatment of symptomatic gallstone disease. 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.[6]Theincidenceof 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.[7] 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 electrosurgical 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.[8] 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.[9]The present study compared monopolar electrocautery and ultrasonic dissection of gallbladder in laparoscopic cholecystectomy.

We found that group I had 14 males and 14 females and group II had 13 males and 15 females.Ali et al[10]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. 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.

We observed that the mean duration of surgery was 36.2 minutes in group I and 27.4 minutes in group II. Previous abdominal surgeries were seen in 2 and 3, comorbidities in 4 and 1 and complications in 6 and 10 in group I and II respectively. Mahabaleshwar et al[11]assessed 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. Bile leak occurred in 40.0% of patients in the electrocautery group and 16.7% of patients in ultrasonic group. Lens cleaning time and duration of surgery were longer in the electrocautery than the ultrasonic dissection group. There was no statistical difference in stone spillage between the groups.

We found that common presenting symptoms were pain abdomen seen in 16 in group I and 10 in group II, heart burn in 8 in group I and 6 in group II and dyspepsia in 10 in group I and 8 in group II. Ultrasonography findings was distended gallbladder in 21 and 19, gallbladder wall thickness > 3 mm in 7 and 9, single calculus in 15 and 12, multiple calculi in 7 and 7, sludge in 6 and 9 and stone size > 1 cm was in 5 and 6 in group I and group II respectively. Outcomewas bile leak in 4 and 3, stone spillage in 2 and 1, gallbladder perforation seen in 7 and 4 and lens cleaning in 1 and 0 in group I and II respectively.Anis et al[12] 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 electrosurgical 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. Mean operative time in group A was 42.2±8.93 minutes versus 35.7±4.85 minutes in group B.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.

The limitation the study is small sample size.

Conclusion

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

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