

Clipless Laparoscopic Cholecystectomy: Our Experience

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ABSTRACT

Background: Laparoscopic cholecystectomy (LC) is accepted as the gold standard treatment of gallstones. Various methods have been developed to close the cystic duct (CD) and cystic artery (CA), but titanium clip application is currently the most frequently used technique. High-tech electro-surgical instruments, such as Harmonic Scalpel (HS), have been used both for dissection of the cystic artery and Cystic duct. The present study was conducted to observe and establish efficacy of clipless cholecystectomy, by use of harmonic scalpel as an alternative, for division and sealing of cystic artery and cystic duct.

Methods: This study was a hospital based, retrospective study, conducted in Govt. Medical College, Srinagar, using medical records. A total of 114 patients included in the study, having been operated by a single surgeon over time period of 5 years from February 2014 to January 2019.

Results: In our study of 114 patients 82 (71.92%) were females and 32 (28.07%) were males with average age of 41.4 years (16-72 yr). No patient was converted to open with average operating time of 24.2 minutes (18-46 minutes). Mean hospital stay was 1.42 days (1-8 days) with no mortality. Postoperative complications were found in 6 (5.2%) patients with bile leak from duct of Lushka in 1 (0.8%) patient, port site infection in 2 (1.7%) patients and fever in 3 (2.6%) patients. Gallbladder perforation intraoperatively was seen in 7 (6.2%) patients.

Conclusions: Use of harmonic scalpel is an excellent option for the cystic duct closure with less time consumption and less complications.

Keywords: Harmonic Scalpel, Laparoscopic Cholecystectomy, Cystic duct, Cystic artery

INTRODUCTION

Laparoscopic cholecystectomy (LC) is accepted as the gold standard treatment of gallstones with advantages in comparison over open cholecystectomy especially for minimal invasiveness and faster convalescence.¹ Various methods have been developed^{2,3} to close the cystic duct (CD) and cystic artery (CA), but titanium clip application is currently the most frequently used technique.^{4,5} Although postoperative bile leakage is rare, but it is a serious complication and occurs in 0.2-0.27% of cases.⁶⁻⁸ Therefore, studies are still going to perform LC in a safer, less complicated and cheaper way. High-tech electro-surgical instruments, such as Harmonic Scalpel (HS), have been used both for dissection of the cystic artery and cystic duct CD.^{2,3} Ultrasonic coagulating shears were developed to allow vessels surgical hemostasis and cutting off without bleeding during laparoscopic surgery, by its sealing effect, which is related to coagulation of protein through high frequency ultrasonic vibrations.⁹ In cholecystectomy, this device is

being used for cutting and coagulating during dissection and removal of the gallbladder from its liver bed.^{10,11} Several worldwide studies reported the clipless cholecystectomy by using the ultrasonically activated shears as the sole instrument to achieve complete hemo-biliary stasis (cystic duct and artery), most of them with case-series.^{3,12,13,14} In most of these studies, there was no hemorrhage reported and the overall incidence of postoperative bile leakage was in agreement with the literature, showing that this technique is as safe as the surgical clip. Similarly, studies using PlasmaKinetic (PK) for the same purpose have been going on.^{15,16} The present study was conducted to observe and establish efficacy of clipless cholecystectomy, by use of harmonic scalpel as an alternative, for division and sealing of cystic artery and cystic duct.

MATERIAL AND METHODS

This study was a hospital based, retrospective study conducted in Sri Maharaja Hari Singh (SMHS) Hospital, an associated hospital with Govt. Medical College, Srinagar, J&K, using medical records. 114 medically fit patients, who underwent clipless cholecystectomy were included in the study, having been operated by a single surgeon over time period of 5 years from February 2014 to January 2019.

Harmonic scalpel (shear) was used for division of both cystic artery and cystic duct in each patient. A small size drain was placed in Morrison's pouch through a 5mm port in each patient and removed on 1st postoperative day. Various factors observed like age, gender distribution, operative time, complications and management of each complication were analysed, tabulated and expressed in terms of mean and average.

Mechanism of Harmonic Device

The harmonic scalpel is a surgical instrument used to simultaneously cut and cauterize tissue. Ultrasonic energy is used in Harmonic scalpel where ultrasonic energy is

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converted to mechanical energy at the active blade. The main mechanism is the active blade which delivers high-grade frictional force while the inactive upper arm holds tissue in apposition. Its main advantages include precise dissection, reliable hemostasis, less lateral thermal spread and charring mainly works by applying pressure and then sealing with a denatured protein coagulum while applying ultrasonic vibration to denature hydrogen bonds perform vessel coagulation. Ultrasonix is the name given to the dissection method by harmonic. The transducer in the handpiece consisted of piezoelectric crystal sandwiched under pressure among metal cylinders. The ultrasonic generator converts ultrasonic energy into mechanical energy. The sealing of the vessels is achieved due to denatured protein coagulum which occurs due to tamponade and coaptation. It has three compatible probes that are the shear, blade and a hook. The shear can coagulate vessels up to 7 mm, whereas the hook and blade only 2 mm in diameter. It has the least thermal spread and smoke production of all the devices.

STATISTICAL ANALYSIS

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0. Continuous variables were summarized as Mean±SD, average and categorical variables were expressed as frequencies and percentages. Appropriate test, whichever necessary, was applied for categorical data. A P-value of less than 0.05 was considered statistically significant.

RESULTS

In our study with a total of 114 patients, majority of the patients were females, 82 (71.92%) were females and 32 (28.07%) were males. (Table-1)

The age of our study group ranged between 16 years to 72 years, with average age of 41.4 years, majority of the patients were between 35-44 year range (42.10%) (TABLE-2). No patient was converted to open with average operating time

Gender	No of patients	Percentage (%)
Male	32	28.07%
Female	82	71.92

Table-1: Gender distribution

S. No	Age group (Yr)	No of patents	Percentage (%)
01	<25	8	7.01
02	25-34	21	18.42
03	35-44	48	42.10
04	45-54	25	21.92
05	>55	12	10.52

Table-2: Age distribution

S. No	Complication	No of patients	Percentage (%)
01	Bile leak	1	0.8
02	Port site infection	2	1.7
03	Fever	3	2.6%

Table-3: Postoperative complications

of 24.2 minutes (Range:18-46 minutes). Mean hospital stay was 1.42 days (Range:1-8 days).

Postoperative complications were found in 6 (5.2%) patients with bile leak from duct of Lushka in 1 (0.8%) patient, port site infection in 2 (1.7%) patients and fever in 3 (2.6%) patients. Gallbladder perforation intraoperatively was seen in 7 (6.2%) patients. Endoscopic retrograde cholangiopancreatography (ERCP) was done in bile leak patient and was managed conservatively and in port site infection patients daily dressings were done. There was no mortality reported in our study (Table-3).

DISCUSSION

Cystic duct is closed by various methods most commonly by Titanium clips with disadvantages of slippage, necrosis of cystic duct, CBD injury due to transfer of accidental thermal injury. Harmonic devices convert electrical energy into ultrasonic vibrations, which is used for dissection, coagulation and cutting of the tissues. Its thermal damage in the rat abdominal wall is width less than 0.2 mm¹⁷ and in the liver bed from gallbladder dissection is lower than that of high-frequency electrosurgery.¹⁸ Because of short area of thermal injury this can be used near vital structures; like common bile duct (CBD).

Most of our patients were females (71.92%) which were similar to other studies like Saha et al.¹⁹

Harmonic scalpel reduces the duration of dissection, with little amount of mist, owing to no wastage of time in smoke evacuation and in changing of instruments. In our study the mean operative time was 24.2 minutes which was comparable to the study done by Jahangir Sarwar Khan et al²⁰ and Ramos et al.²¹

There was no bile leak from the cystic duct in our study, there was a single bile leak (0.8%) from duct of lushka which is in accordance with the other studies like Huscher et al², Gelmini et al²², Bessa et al²³, El nakeeb et al.²⁴ In our case the patient was managed conservatively by ERCP and with sphinterotomy.

In our study port site infection was found in 2 (1.7%) patients who were managed conservatively by daily dressings and antibiotics and postoperative fever in 3 (2.6%) patients managed conservatively. Gallbladder perforations occurred in 7 patients (6.14%) and the mean hospital stay was 1.42 days which were similar to the study done by Elshoura et al.²⁵

CONCLUSION

Use of harmonic scalpel is cost effective and an excellent alternate option for the cystic duct closure with less time consumption and less complications.

Ethical approval

The study was approved by the institutional ethics committee

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