



ORIGINAL RESEARCH PAPER

General Surgery

HARMONIC SCALPEL ASSISTED LAPAROSCOPIC CHOLECYSTECTOMY VS MONOPOLAR ASSISTED LAPAROSCOPIC CHOLECYSTECTOMY STUDY IN A TERTIARY CARE INSTITUTE AMRAVATI.

KEY WORDS: harmonic Scalpel Assisted Laparoscopic Cholecystectomy (HLC), Conventional Laparoscopic Cholecystectomy (CLC), Monopolar Devices

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ABSTRACT

Background : Laparoscopic cholecystectomy (LC) is the standard of care for Gall Stone diseases. Conventionally monopolar energy source is used for dissection of cystic artery and duct and dissection of Gall Bladder from GB fossa. There are high risk of thermal injury and biliary complications, more visceral and solid organ injury due to frequent exchange of instruments. All these factors lead to increased operating time and complications. The use of harmonic assisted laparoscopic cholecystectomy has decreased the operating time and complications. The objective of this study was to compare Harmonic assisted Laparoscopic cholecystectomy with conventional monopolar energy.

Methods: This prospective study was carried out on 70 patients which were randomly assigned to either group. Total 35 patients were present in conventional monopolar assisted LC and 35 patients in Harmonic assisted LC.

Results: This study reveals that in harmonic assisted Laparoscopic cholecystectomy time taken for surgery is less, minimal thermal dispersion of energy, reduced incidence of bleeding and GB perforation compare to conventional monopolar energy.

Conclusions: Harmonic Assisted Laparoscopic Cholecystectomy advantage over Conventional Monopolar Assisted Laparoscopic Cholecystectomy with respect to operating time, postoperative pain, and perioperative complications. Thus its use should be advocated where Facilities are available.

INTRODUCTION

Laparoscopic cholecystectomy (LC) is considered worldwide the "gold standard" in the surgical treatment of symptomatic gallbladder lithiasis and acute cholecystitis, because it offers well-known and more definite advantages in comparison with the laparotomic procedure.

The conventional Laparoscopic cholecystectomy uses monopolar hook and other instruments for dissection and titanium clips for cystic duct and cystic artery occlusion. Alternative techniques were also devised like linear staples, endoloops /sutures, but were hardly used. The use of monopolar energy source for dissection is associated with high risk of thermal injury and more biliary complications, more visceral and solid organ injury due to frequent exchange of instruments [1]. There are also higher chances of slippage of titanium clips due to change of instruments during surgery [2], with the use of electrocautery, there is excessive smoke production and hence diminishes the vision. Hence there are increased chances of lateral tissue damage.

The ultrasound scalpel relies on the application of ultrasound within the harmonic frequency range of tissue and allows simultaneous coagulation and cutting. The temperature created and lateral spread of energy are lower than caused by monopolar hooks and thus reducing the risk of tissue damage [3]. The harmonic scalpel can seal luminal structures upto 5mm thickness and thus can be used to divide cystic artery and duct. It has been shown an effective method in various studies [4]. Using harmonic scalpel for complete procedure except the clipping of cystic duct may provide the advantage of shorter operating time, less bleeding and other complications when compared to conventional laparoscopic cholecystectomy [5]. Hence this study was done to assess the role of harmonic scalpel in laparoscopic cholecystectomy, where whole procedure was done with harmonic scalpel except the clipping of cystic duct which was done by titanium clips, as compared to conventional laparoscopic cholecystectomy.

METHOD

This randomized study was carried out prospectively on 70 patients with symptomatic cholelithiasis who underwent cholecystectomy between Jan 2019 to December 2019 at Dr

Panjabrao Deshmukh memorial medical college. All the surgeries were performed under general anesthesia.

Following patients were excluded from the study:- Patients with acute cholecystitis were excluded from the study.

Laparoscopic cholecystectomy combined with some other procedure.

Laparoscopic cholecystectomy with CBD exploration.

Complication of laparoscopic cholecystectomy in form of CBD injury recognized pre-operatively.

Suspected GB Carcinoma and pregnant woman.

The patients were randomly allocated to either CLC or HLC group. For CLC group patients the conventional four port cholecystectomy was performed. After obtaining pneumoperitoneum, cystic artery and duct were dissected and clipped using titanium clips and then divided. Gall Bladder was separated from the GB fossa using monopolar hooks.

Patients allocated under HLC group were started with standard four port cholecystectomy. Pneumoperitoneum was obtained with carbon dioxide. The anatomy of Calot's triangle was well delineated to confirm for any variations. Cystic duct was clipped with titanium clips and divided. Further Harmonic scalpel was used wherever energy source was required. Gall Bladder was separated from GB bed using harmonic scalpel.

The primary outcome parameter studied was operating time which was calculated in minutes. The other parameters which was compared was Surgical Site infection (SSI), significant bleeding and gall bladder perforation appearing intraoperatively.

RESULTS

A total of 70 patients were part of this study in which 35 patients were included in CLC group and 35 were in HLC group. The demographic profile of the patients in both the groups was comparable. In the study the participants were

from age group 20-75 years. Maximum patients were in age group 41 – 60 years.

Table 1: Distribution according to age group

Age group in Years	CLC group	HLC group
20 – 40	6	5
41 – 60	21	23
61 – 75	8	7

Out of all patients in the study, 18 were male and 52 were female showing that Gall Bladder disease is more common in female.

Table 2: Sex distribution

Sex	CLC group	HLC group
Male	11	7
Female	24	28

Out of all patients 53 patients had Body mass index (BMI) less than 30 while 17 patients had BMI greater than 30.

Table 3: Distribution according to BMI

	CLC group	HLC group
BMI <30	28	25
BMI >30	7	10

The mean duration of completing surgery in HLC group was 42 min, ranging from minimum 31 mins to maximum 68 mins. The mean duration of time required to complete surgery in CLC group was 58 min with minimum and maximum time required was 48 and 85 respectively. This shows that average duration of surgery was significantly reduced in Harmonic assisted Laparoscopic cholecystectomy.

Table 4: Mean duration of surgery

	CLC group	HLC group
Mean duration of surgery in minutes	58	42

Two variables of intra operative complications (Significant bleeding and gall bladder perforation) were compared in CLC and HLC group. In CLC group 3 patients had significant bleeding resulting in increased operative time and consequent drain placement, while in HLC group only 1 had significant bleeding. 4 patients in CLC group has gall bladder perforation resulting in bile leakage and increased operative time, while in HLC group there were only 2 patients who had gall bladder perforation.

Table 5: Intra operative complication

Intra operative complication	CLC group	HLC group
Significant bleeding	3	1
GB Perforation	4	2

Only 1 patient had postoperative intrabdominal collection which was detected by ultrasound when patient was complaining of persistent pain in postoperative period, patient was from CLC group, patient was managed conservatively and follow up ultrasound showed resolution of collection. Total 4 patients had superficial surgical site infection (SSI), out of which 3 patients were from CLC group and 1 patient was from HLC group. All the patients were managed conservatively to which they responded well.

Table 6: Post operative complications

Post operative complication	CLC group	HLC group
Intra abdominal collection	1	0
SSI	3	1

DISCUSSION

Symptomatic cholelithiasis is one of the most commonly encountered disease in outdoor setting as well as in hospital settings [6]. Laparoscopic cholecystectomy has become the standard of care for Gall stone diseases. Conventionally

monopolar energy source has been used for cholecystectomy in which incidence of bleeding and Gall bladder perforation rate is more.

There have been various studies where harmonic scalpel has been used for entire surgery [7,8]. This is based on the concept that harmonic scalpel can seal vessel upto 5mm diameter. In our study entire dissection was carried out with Harmonic Scalpel except clipping of cystic duct, where titanium clips were used. This was done to reduce the bile leakage from the divided cystic duct. Predicting the cystic duct diameter in patients with previous cholecystitis or cholangitis is difficult. Bleeding during LC occurs mainly from slippage of clips applied on cystic artery or from GB fossa. The safety of harmonic scalpel for effective occlusion and division has been shown in studies [9]. The bleeding from GB fossa is effectively controlled by using harmonic hook as it produces less smoke.

GB perforation is one of the most common intraoperative complications while doing LC. It causes operating procedure long and difficult due to continuous leakage of bile. It is mainly caused due to traction by grasper and tissue damage due to use of energy source. The Harmonic scalpel reduces the lateral thermal spread and decreases the GB perforation rate. In our study 4 patients in CLC group and 2 patients in HLC group has GB perforation.

The risk of SSI depends on various factors like duration of surgery, spillage of bile, nutritional status of patients, any comorbidities. The rate of SSI is less in laparoscopic surgery is less compared to the open surgery. In our study 3 patients had SSI in CLC group compared to 1 patient in HLC group. All cases were superficial SSI which were managed conservatively.

CONCLUSION

Laparoscopic cholecystectomy performed with ultrasonic devices is effective and feasible. This method offers considerable advantages, such as decreased total operating time, minimal thermal dispersion of energy, reduced incidence of bleeding and GB perforation. The incidence of SSI and intraperitoneal collection was less in HLC group but it was not significant.

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