

## To Study Cystic Artery Occlusion by Harmonic Scalpel In Patients Undergoing Laproscopic Cholecystectomy

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### Abstract

Laposcopic cholecystectomy is considered the gold standard treatment in the surgical treatment of symptomatic cholelithiasis and acute cholecystitis. Standard laproscopic cholecystectomy is usually performed using monopolar electrosurgical hook for dissection and titanium clips for occluding the cystic duct and cystic artery. This is a prospective study in which we have used the harmonic scalpel during laproscopic cholecystectomy to seal the cystic artery in order to avoid the known risks associated with the use of titanium clips including slippage and thus leakage, to avoid transmission of energy through clips while using electrocautery and lateral tissue damage through electrocautery. The harmonic scalpel can also be used for dissection of Calot's triangle and lifting of gall bladder from liver bed. Most surgeons have accepted its use for laproscopic cholecystectomy. Clipless cholecystectomy is an edge over conventional cholecystectomy in terms of less intraoperative blood loss, less chances of inadvertent gall bladder perforation, less post operative drainage, decreased post operative pain and early discharge.

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### I. Introduction

Acute cholecystitis is an acute inflammatory condition of gall bladder often contributable to gall stones. Laproscopic cholecystectomy is considered the gold standard treatment in the surgical treatment of symptomatic cholelithiasis and acute cholecystitis as it offers well known and more definite advantages in comparison with the laprotomic procedures. Standard laproscopic cholecystectomy is usually performed using monopolar electrosurgical hook for dissection and titanium clips for occluding the cystic duct and cystic artery.

Even if laproscopic cholecystectomy is considered safe but some pitfalls are associated with the use of monopolar electrosurgical cautery, such as the high risk of thermal injuries and significantly higher post operative biliary complications, thermal smoke production and lateral tissue damage. Visceral or solid organ injuries can also occur due to the frequent instrument exchanges. Due to the transmission of energy through the titanium clips, there is an increased risk of gall bladder perforation, bile leakage due to slippage of the applied clips and those slipped clips can also act as nidus for infection.

The harmonic scalpel can be used for dissection of Calot's triangle and lifting of gall bladder from liver bed. It can also seal up to 5 mm thickness of luminal structures (vessels) and thus can be used in dividing cystic artery and cystic duct. Since the cystic duct diameter may vary as per the existing pathology such as acute/chronic cholecystitis or fibrotic GB etc. thus complete clipless cholecystectomy is not yet acceptable due to the fear of cystic duct leak. Clipless cholecystectomy version of laproscopic cholecystectomy except for the division of cystic duct may provide the advantage of shorter operating time with a reduced risk of cystic duct leakage.

The ultrasonically activated scalpel (Harmonic) is an advanced cutting, coagulating and cavitating instrument. The temperature obtained and energy spread are lower than those detected with monopolar hook, thus reducing the aforementioned risks. They act by their sealing effects without any bleeding which is related to coagulation of protein through high frequency vibrations.

## **II. Material And Methods**

This study was a prospective randomized study conducted in the department of General surgery, Pt. B. D. Sharma PGIMS Rohtak over the period of two years from July 2017 to April 2019, and a total of 100 patients were scheduled for laproscopic cholecystectomy for benign gall bladder disease and were divided into two groups – Group A and Group B (Control group).

Group A patients underwent laproscopic cholecystectomy by ultrasonic harmonic scalpel in which it was used as a dissector for dissection of cystic artery and after proper visualization its section was performed with single application of ultrasonically activated scissors at minimum distance, the gall bladder was also lifted from the liver bed using the harmonic scalpel. Group B patients underwent conventional laproscopic cholecystectomy by using clips and monopolar cautery. Drainage was systematically performed only in selected cases such as severe acute cholecystitis, intraoperative bleeding or accidental opening of gall bladder during dissection. Patients were cautiously monitored post operatively. At the end of the study the qualitative and quantitative data was analysed using appropriate tests and a value of  $p < 0.05$  was considered significant.

## **III. Results**

The study was carried out on 100 patients with calculous cholecystitis evaluated from history, clinical examinations, and investigations, the patients were randomly divided in to two groups A and B as mentioned earlier. Mean age in group A was found to be  $39 \pm 10.73$ (SD) and in group B was  $37.74 \pm 9.67$ (SD). Disease was more common in females, in both the groups. Maximum number of patients had symptomatic gall stone disease. Comorbidities most commonly associated were diabetes, hypertension, and smoking. Maximum number of patients had BMI of 20-24.99 in both the groups. All 100 patients included had gall stones in the gall bladder proved radiologically and there was no evidence of choledocholithiasis. Various intraoperative findings observed are as shown in the table. The abdominal drain (20 F, through the 4<sup>th</sup> port) was put in the patients only when indicated i.e. to drain blood or bile to avoid stasis in abdominal cavity, the drain content was sero-hemorrhagic in all patients and average amount drained in group A was 54.6 ml and in group B 65.2 ml, hence it was lower in group A as compared to group B with statistical significance. In majority of patients the duration of surgery was 51-70 minutes, however the difference in the number of patients underwent surgery within one hour was 31 in group A and 16 in group B, which was statistically significant. Post operative pain was assessed using VAS at 12, 24, 48 hours and one week, VAS more than 3 was taken as significant, significant pain was present in 23 and 17 patients at 12 hours and 24 hours respectively in group A as compared to 32 and 23 patients at 12 hours and 24 hours respectively in group B which was statistically significant. Post operative nausea was less in group A patients which was statistically significant. Maximum number of patients were discharged within 48 hours of surgery, amongst these 26 patients were discharged within 24 hours in group A and 19 patients in group B.

## **IV. Discussion**

Laproscopic cholecystectomy is one of the most commonly performed elective surgeries all over the world. Metallic clip is most commonly used method for cystic artery and duct closure all over the world. However use of these clips is not free from complications which includes bile leaks (0.2-0.27%, might be due to slippage, mismatched arms and pressure necrosis of duct. Migration of clip might lead to biliary stone formation and clip embolization, most dreaded complications included clipping of common bile duct and right hepatic artery, significant inflammatory reaction to metallic clips have also been reported in literature. The present study was conducted to evaluate the efficacy of harmonic scalpel (ultrasonic dissection) in laproscopic cholecystectomy.

## **V. Conclusion**

In our study, gall stone disease is mainly a disease of middle aged female. Laproscopic cholecystectomy is the gold standard treatment in which clipless cholecystectomy is emerging with an edge over conventional cholecystectomy in terms of less intra-operative blood loss, less post-operative drainage with decreased morbidity, pain and early discharge. However availability of the instrument and expensive setup is a limiting factor.

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