

ORIGINAL RESEARCH

Comparison of liga clips and bipolar diathermy for cystic artery sealing in laparoscopic cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy, a minimally invasive procedure to remove the gallbladder, requires secure sealing of the cystic artery to prevent bleeding. The present study was conducted to compare liga clips and bipolar diathermy for cystic artery sealing in laparoscopic cholecystectomy. **Materials & Methods:** The study was conducted at PMCH Patna, Bihar from August 2021 to August 2023. 76 patients diagnosed with gallbladder disease and scheduled for laparoscopic cholecystectomy were divided into 2 groups of 38 each. Group I patients underwent laparoscopic cholecystectomy with the use of bipolar diathermy for sealing the cystic artery, while group II patients underwent laparoscopic cholecystectomy with the application of nonabsorbable Liga clips for sealing the cystic artery. Parameters such as operative time (in mins), intra operative drain volume (ml), immediately drain volume (ml), drain volume on day 1 and day 5, post- op bleeding and mortality etc. was recorded. **Results:** Group I had 18 males and 20 females and group II had 19 males and 21 females. In group I and group II, GB injury was seen in 5 and 2, cystic duct injury in 1 and 0 respectively. The mean operative time (in mins) was 51.2 and 57.5, intra operative drain volume (ml) was 46.2 and 45.1, immediately drain volume (ml) was 35.8 and 36.2, drain volume on day 1 was 23.1ml and 23.0ml and drain volume on day 5 was 14.2ml and 14.7 ml. The difference was significant ($P < 0.05$). Post- operative bleeding was seen in 1 in group I only. The difference was non- significant ($P > 0.05$). **Conclusion:** In terms of overall results, post-operative morbidity, and mortality, bipolar cautery is a safe substitute for clipping when it comes to sealing the cystic artery. Bipolar cautery is an economical, dependable, and successful way to treat the cystic artery.

Keywords: Laparoscopic cholecystectomy, Liga clips, cystic artery

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INTRODUCTION

Laparoscopic cholecystectomy, a minimally invasive procedure to remove the gallbladder, requires secure sealing of the cystic artery to prevent bleeding. Two commonly used methods for sealing the cystic artery are Liga clips and bipolar diathermy. Each method has its advantages and potential drawbacks.¹

Liga clips are small, titanium or polymer clips used to mechanically close blood vessels or ducts during surgery. Liga clips are well-established for providing a secure and reliable seal.² The application is straightforward, and the technique is familiar to most surgeons. Since Liga clips don't use heat, there's no risk of thermal injury to surrounding tissues. Although rare, clips can dislodge or migrate, potentially causing complications. The presence of metal or polymer clips can be an issue for some patients and may cause discomfort or complications in the long term. Liga

clips can be more expensive than some other methods.³

Bipolar diathermy uses electrical energy to coagulate and seal blood vessels. The current passes between two electrodes on the instrument, causing localized heating and coagulation.⁴ It provides reliable coagulation and sealing of vessels. No foreign body remains in the patient, eliminating the risk of clip migration.⁵ Generally, more cost-effective compared to using clips. There is a risk of thermal injury to surrounding tissues, which can lead to complications like bile duct injury. It requires precise technique and experience to avoid excessive thermal spread. It requires specific bipolar diathermy equipment, which may not be available in all surgical settings.⁶ The present study was conducted to compare Liga clips and bipolar diathermy for cystic artery sealing in laparoscopic cholecystectomy.

MATERIALS & METHODS

The study was conducted at PMCH Patna, Bihar from August 2021 to August 2023. The present study was conducted on 76 patients diagnosed with gallbladder disease and scheduled for laparoscopic cholecystectomy of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, etc. was recorded. Patients were divided into 2 groups of 38 each. Group I patients underwent laparoscopic cholecystectomy

with the use of bipolar diathermy for sealing the cystic artery, while group II patients underwent laparoscopic cholecystectomy with the application of nonabsorbable Liga clips for sealing the cystic artery. Parameters such as operative time (in mins), intra operative drain volume (ml), immediately drain volume(ml), drain volume on day 1 and day 5, post-op bleeding and mortality etc. was 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 | Group II |
|--------|-------------------|------------|
| Method | bipolar diathermy | Liga clips |
| M:F | 18:20 | 19:21 |

Table I shows that group I had 18 males and 20 females and group II had 19 males and 21 females.

Table I Assessment of parameters

| Parameters | Group I | Group II | P value |
|-----------------------------------|---------|----------|---------|
| GB injury | 5 | 2 | 0.04 |
| Cystic duct injury | 1 | 0 | 0.05 |
| Operative time (in mins) | 51.2 | 57.5 | 0.63 |
| intra operative drain volume (ml) | 46.2 | 45.1 | 0.90 |
| immediately drain volume (ml) | 35.8 | 36.2 | 0.85 |
| drain volume on day 1 | 23.1 | 23.0 | 0.61 |
| drain volume on day 5 | 14.2 | 14.7 | 0.32 |

Table I, graph I shows that in group I and group II, GB injury was seen in 5 and 2, cystic duct injury in 1 and 0 respectively. The mean operative time (in mins) was 51.2 and 57.5, intra operative drain volume (ml) was 46.2 and 45.1, immediately drain volume (ml) was 35.8 and 36.2, drain volume on day 1 was 23.1ml and 23.0ml and drain volume on day 5 was 14.2ml and 14.7 ml. The difference was significant ($P < 0.05$).

Graph I Assessment of parameters

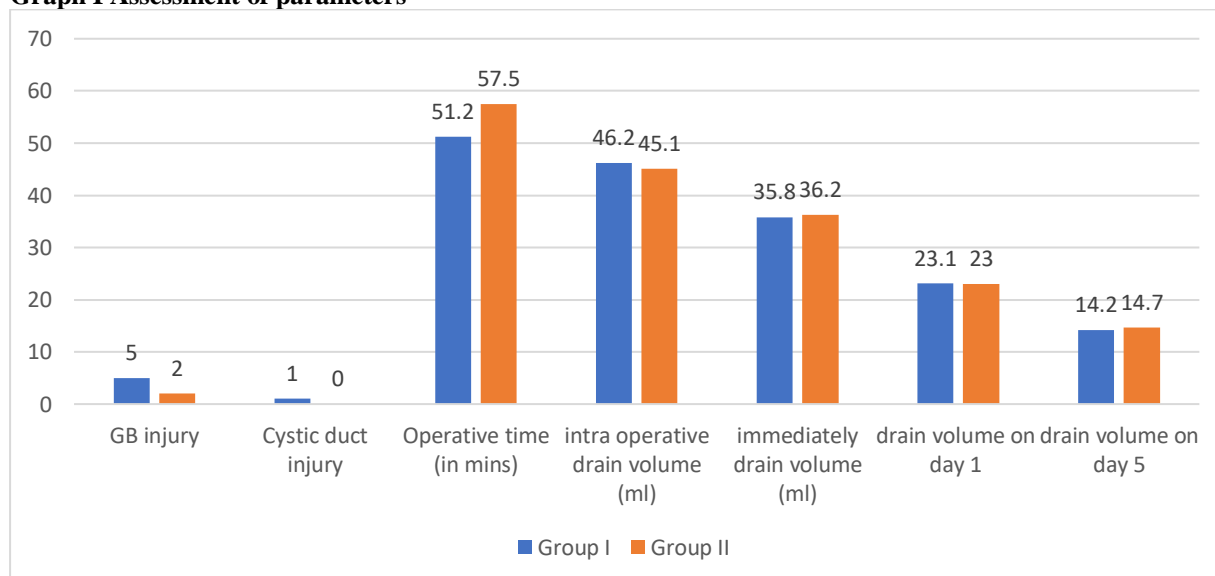


Table II Assessment of post-operative parameter

| Parameters | Group I | Group II | P value |
|------------------|---------|----------|---------|
| Post-op bleeding | 1 | 0 | 0.95 |
| Mortality | 0 | 0 | |

Table II shows that post-operative bleeding was seen in 1 in group I only. The difference was non-significant ($P > 0.05$).

DISCUSSION

Since ancient times, gallstones have been acknowledged as a health concern and have caused a great deal of discomfort for many.⁷ The most common procedure for biliary tract disorders and the second most common surgical procedure in modern medicine is cholecystectomy, or surgical removal of the gallbladder.⁸ Gallbladder cancer (GBC) varies geographically and ethnically, and one of the highest recorded occurrences in the world is found in Northern India. The current standard procedure for planned and urgent gallbladder removal is laparoscopic cholecystectomy (LC).^{9,10} The present study was conducted to compare Liga clips and bipolar diathermy for cystic artery sealing in laparoscopic cholecystectomy.

We found that group I had 18 males and 20 females and group II had 19 males and 21 females. In group I and group II, GB injury was seen in 5 and 2, cystic duct injury in 1 and 0 respectively. Kumar et al¹¹ assessed the feasibility and effectiveness of using Liga clips compared to a bipolar diathermy system for laparoscopic sealing of the cystic artery. In this study, they observed that mean age in Group A was 56.1 years, and in Group B, it was 55.08 years. 7 patients (14%) in Group A and 4 patients (8%) in Group B experienced gallbladder (GB) injury. We did not find significant difference in the operative time between the groups ($P=0.154$). None of the patients in either of the two groups experienced post-operative bleeding, and there were no instances of mortality observed in either group.

We observed that the mean operative time (in mins) was 51.2 and 57.5, intra operative drain volume (ml) was 46.2 and 45.1, immediately drain volume (ml) was 35.8 and 36.2, drain volume on day 1 was 23.1 ml and 23.0 ml and drain volume on day 5 was 14.2 ml and 14.7 ml. Post-operative bleeding was seen in 1 in group I only. Emmi et al¹² examined the use of bipolar electrocautery vs clip ligation to control the cystic artery during laparoscopic cholecystectomy. In this study, the cystic artery was controlled using bipolar electrocautery in 30 patients (group B) and by surgical clips in 30 patients (group A). In both groups, the length of stay in the hospital and the duration of surgery were similar. In Group A, no incidences of intraoperative hemorrhage or bile leak were documented, but Group B had two cases of bile leak and four cases of intraoperative cystic artery bleed. They concluded that especially in developing countries, bipolar diathermy and clip application are equally effective strategies for hemostatic control of the cystic artery during laparoscopic cholecystectomy. Singal et al¹³ evaluated the efficacy, safety and complications of non-absorbable sutures ligation versus clips application in laparoscopic cholecystectomy, and compared the operative time and cost effectiveness of the two surgical approaches in laparoscopic cholecystectomy. The study included 160 patients who were diagnosed with chronic

cholecystitis. The cystic pedicle was tied with non-absorbable material (silk 2-0) in group A and with Titanium clips using a clip applicator in group B. The application of silk and clips for cystic duct and artery ligation in laparoscopic cholecystectomy can be safely used. The mean time for ligation of cystic duct was 2.50 (SD ± 0.25) in group A and 1.50 min (SD ± 1.85) in group B, with $P < 0.001$, which was significant. Similarly, the mean time for ligation of cystic artery was 1.50 min (SD ± 0.20) in group A and 1.36 min (SD ± 0.11) in group B, with $P > 0.001$. There were no postoperative complications, such as wound infection or bile leakage, in any of the two methods. The cost of material for silk suture (40-60 Rupees or 0.62–0.92 \$) is definitely much lower than that for Liga clips (790-1000 Rupees or 12.28–15.55 \$). For the use of clips, a clip applicator is required, but in case of silk ligation no special instrument is required and silk is also easily available.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that in terms of overall results, post-operative morbidity, and mortality, bipolar cautery is a safe substitute for clipping when it comes to sealing the cystic artery. Bipolar cautery is an economical, dependable, and successful way to treat the cystic artery.

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