

Research Article

Comparative Analysis of Direct Pressure and Electrocauterization Techniques for Hemorrhage Control in the Liver Bed during Laparoscopic Cholecystectomy

Dharmoon Arija^{1*}, Syed Moin Islam Shah², Saiqa Rafiq³, Nida Ahmed⁴, Abdul Salam Memon⁵, Nazia Naseer⁶

^{1*}Assistant Professor General Surgery, Gulam Muhammad Mahar Medical College Hospital Sukkur Pakistan.

²Assistant Professor General Surgery, Suleman Roshan Medical College Tando Adam Pakistan.

³Senior Registrar General Surgery, Makran Medical College, Turbat Pakistan.

⁴Assistant Professor General Surgery, Karachi Institute of Medical Sciences Karachi Pakistan.

⁵Assistant Professor General Surgery, Liaquat University of Medical and Health Sciences Jamshoro Pakistan.

⁶Assistant Professor General Surgery, Makran Medical College, Turbat Pakistan.

Email: ²drmoishah67@gmail.com, ³saiqarafieeq@gmail.com, ⁴nida_ahmed83@yahoo.com, ⁵dr_abdulsalam12@yahoo.com, ⁶nazianaseer.nn@gmail.com

Corresponding Author: ^{1*}dharmoonarija71@gmail.com

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ABSTRACT

Background: Gallstones affect a significant percentage of the population, and the gold standard treatment is laparoscopic cholecystectomy. Hemorrhage, however, is a frequent complication, and bleeding from the liver bed is difficult to control. This study compares two hemostatic methods—direct pressure with a hot sponge and electrocauterization—to control hemorrhage from laparoscopic cholecystectomy. Direct pressure is 83% effective and electrocauterization is 65% effective according to previous studies.

Objective: To compare and evaluate the effectiveness of electrocauterization and direct pressure in managing intraoperative bleeding and postoperative pain.

Study Design: A descriptive study

Duration and place of study: This study was conducted in Gulam Muhammad Mahar Medical College Hospital Sukkur from December 2023 to December 2024

Methodology: 100 patients with ultrasound-proven cholelithiasis, ranging from 12 to 70 years, underwent laparoscopic cholecystectomy. Patients were randomly allocated in two groups: Group B received monopolar electrocauterization, while Group A received direct gauze compression to manage liver bed hemorrhage. Gallbladder fossa intraoperative bleeding was the primary outcome, and postoperative bleeding and pain were measured using the visual analogue scale at 6, 12, and 24 hours.

Results: There were a total of 100 participants of this study. All the people in this study were equally divided into 2 groups (50 in each group). The average age calculated was 40.39 for Group A and 42.22 for Group B. There were a total of 22 males and 78 females overall in this study. Bleeding during surgery was secured in 86% cases (n=43).

Conclusion: In laparoscopic cholecystectomy, electrocauterization is more effective than direct pressure in achieving haemostasis in the presence of liver bed.

INTRODUCTION

Gallstones are a common condition that strikes approximately 29% of women and 6% of men across all age groups [1]. The gold standard for the treatment of gallbladder disorders, including gallstones, is laparoscopic cholecystectomy [2]. Bleeding is a common side effect of laparoscopic gallbladder resection [3]. When sudden, heavy bleeding is obscuring the field, it is harder and often requires

conversion to an open procedure [4]. Hemostatic techniques employed during laparoscopic cholecystectomy are direct pressure to the liver bed, ultrasonic coagulation, and monopolar and bipolar electrocautery [5, 6].

A study of 451 patients carried out in the Department of General Surgery of King Edward Medical University at Lahore proved that direct pressure and other haemostatic strategies are

effective to prevent bleeding in the liver bed during laparoscopic cholecystectomy [7]. The study identified that the direct pressure application was 83% effective in maintaining control over bleeding. A research in Al-Jamhori Teaching Hospital, Mosul, on 320 patients underwent laparoscopic cholecystectomy [8]. The results indicated that electrocautery was effective in inducing haemostasis in 65% of the patients throughout the course of treatment. In this research, a simple and effective method of minimizing liver bed haemorrhage during laparoscopic cholecystectomy is considered. There are two popular methods of hemostatizing small tributaries: electrocauterization and direct pressure with a sponge [9]. The aim is to evaluate and compare the safety and effectiveness of these two methods' ability in managing intraoperative bleeding and postoperative pain. In contrast to previous research, which compared electrocautery to other treatment methods, this research specifically compares it to direct pressure. By comparing individual procedures and analyzing them separately, we aim to determine which one results in superior surgical outcomes. This gives surgeons an easier way of deciding on the ideal haemostatic technique for laparoscopic cholecystectomy.

METHODOLOGY

This research is a descriptive study which was performed in our hospital. All the people who were a part of this study were aged from 12 years to 70 years and they underwent laparoscopic cholecystectomy. All the participants were having cholelithiasis which was confirmed on an ultrasound.

Exclusion criteria: Those patients who had multiple abdominal surgeries previously and had a history of bleeding disorder were not a part of this study. Moreover, those having

ascites which were confirmed on an ultrasound were also excluded.

All the patients who presented during the study period and were in line with the inclusion and exclusion criteria were recruited through a non-probability purposive sampling process. The study was conducted following approval from the Institutional Review Board and the Ethics Committee. A sample of 100 patients (50 in each group) was calculated on a 5% significance level and 90% power, anticipating an 83% success rate of direct pressure versus 65% for electrocauterization. Following informed consent from each patient, demographic details like name, age, gender, and address were collected on a structured proforma.

They were randomly divided into two groups on the basis of lottery and subjected to a three-port laparoscopic cholecystectomy done by a consultant surgeon. In Group A, liver bed haemorrhage was controlled with direct gauze pressure for 5 minutes, whereas Group B employed monopolar electrocauterization. Those failing cases were handled with further haemostatic interventions. The main goal was intraoperative visual examination of leaking from the gallbladder fossa, while secondary results were postoperative bleeding and pain scores measured with the visual analogue scale at 6, 12, and 24 hours postoperatively.

RESULTS

There were a total of 100 participants of this study. All the people in this study were equally divided into 2 groups (50 in each group). The average age calculated was 40.39 for Group A and 42.22 for Group B. There were a total of 22 males and 78 females overall in this study. The distribution of gender according to groups is shown below in table number 1.

Table No. 1:

Gender	Group A	Group B
Male	6	5
Female	44	45

Table number 2 shows bleeding status during surgery and drain placement.

Table No. 2:

	Group A	Group B
Bleeding status during surgery		
• Unsecured	7	2
• Secured	43	48
Placement of drain		
• Yes	8	6
• No	34	42
Blood collection		
• Yes	0	0
• No	8	6
Postoperative hematoma on Ultrasound after 24 hours		
• Yes	0	0
• No	43	48

Table number 3 shows pain status at 6, 12, and 24 hours in the patients who secured bleeding during surgery.

Table No. 3:

	Group A (n=43)	Group B (n=48)
6th Hour		
• Mean	7.55	6.75
• SD	0.61	1.34
• Min	6.00	3.00
• Max	9.00	9.00
12th Hour		
• Mean	4.77	5.55
• SD	0.96	1.22
• Min	3.00	2.00
• Max	7.00	8.00
24th Hour		
• Mean	3.08	3.60

• SD	0.68	1.10
• Min	2.00	1.00
• Max	6.00	7.00

DISCUSSION

The most frequent surgical procedure carried out in surgical centres for the treatment of gallbladder disease and symptomatic gallstone disease is laparoscopic cholecystectomy [10, 11]. Due to its benefits, such as less postoperative pain, better cosmetic outcomes, shorter hospital stays, and quicker recovery, it is preferred over open surgery [12]. Although generally accepted as the gold standard for gallbladder surgery, there are several risks associated with it. Of these, intraoperative bleeding occurs in less than 2% of cases and bile duct injury in 0.6% of cases [13]. The most serious and lethal complication of laparoscopic cholecystectomy remains haemorrhage, which may result from the liver bed, cystic artery, port site, right hepatic artery, and inferior vena cava [14]. The increased vascularity, fragile tissues caused by inflammation, and the presence of adhesions render it more challenging for surgeons to dissect Calot's triangle, and bleeding issues are more commonly seen in acute conditions.

Haemostasis of the gallbladder bed can usually be achieved with laparoscopic application of sutures Ligatures, and direct pressure with surgical gauze, electrocautery [15, 16]. The effect of electrocauterization and direct pressure were investigated in this study as a means to manage liver bed haemorrhage following laparoscopic cholecystectomy. In this study, our findings revealed that electrocauterization was much superior compared to direct pressure.

One recent study determined that the haemostatic effectiveness of direct pressure and the endoclip technique was 83% and 100%, respectively [17]. Chan et al. (2000) report that, although the endovascular gastrointestinal anastomosis stapler can be effective in controlling bleeding, it may also fail, leading to major blood loss and requiring an open procedure [18]. In these instances, profuse bleeding usually precluded the prompt use of clips, thus haemostasis was achieved using direct pressure with surgical gauze and a 10 mm smooth-tipped spoon forceps.

Karne et al. (2014) reported that liver bed haemorrhage was present in 12.5% of patients after laparoscopic cholecystectomy, and acute cases were twice as frequent as chronic cases [19]. Likewise, Sahu et al. (2013) identified that more than 40% of patients with acute cholecystitis presented with a gallbladder tightly adhered to the liver bed [20]. They stressed that in these situations, careful skeletonization, cutting, and ligation of arteries are necessary. This problem arises as a result of anatomical changes caused by pericholecystitis, which warp the natural cleavage plane between the gallbladder and liver bed and raise the risk of injury to crossing arteries when dissecting.

This research considered a frequently neglected aspect of postoperative pain following laparoscopic cholecystectomy (LC). Although previous research did not contrast pain intensity based on haemostatic maneuvers used in surgery, we assessed postoperative pain in the treatment groups at the 6th, 12th, and 24th hours. The results indicated that patients subjected to electrocautery experienced significantly higher mean pain scores at the 12th and 24th hours compared to the direct pressure group.

CONCLUSION

In laparoscopic cholecystectomy, electrocauterization is more effective than direct pressure in achieving haemostasis in the presence of liver bed bleeding.

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Conflict in the interest

The authors had no conflict related to the interest in the execution of this study.

Permission

Prior to initiating the study, approval from the ethical committee was obtained to ensure adherence to ethical standards and guidelines.

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