MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218\makrjms.2023.933.936

A Comparative Study of Bileduct Injuries During Laparoscopic Cholecystectomy With and Without Biliary Mapping Using Methylene Blue

[1]Susavan Das and [2]Sayak Roy
[1]*Department of General Surgery, Kalimpong District Hospital, India*
[2]*Department of General Surgery, Siliguri District Hospital, India*

ABSTRACT
The most common operation on the digestive tract is laparoscopic cholecystectomy (LC). Many studies have found that the use of cholecystectomy has grown since the introduction of laparoscopy. Bile duct injuries are the third most common type of injury in general surgical practise. It is frequently associated with a greater rate of death and morbidity. It causes reduced morbidity if diagnosed early and treated promptly. To compare the incidence of bile duct injuries in laparoscopic cholecystectomy with and without biliary mapping using methylene blue in patients who are admitted in Kalimpong district hospital. The present study was a comparative study. This study was conducted from May 2021 to April 2022 at department of general surgery in Kalimpong district hospital. Total 100 patients were included in this study. The mean operative time of the patients in with methylene Blue was 62.02 4.413. Without methylene blue, the patient's mean operative time was 94.01 6.521. The mean operative time distribution vs. group was statistically significant (p = 0.001). Lap to open conversion occurred in 2 patients treated with methylene blue and 16 patients treated without methylene blue. Methylene blue had a statistically significant (p = 0.0002) association with lap to open conversion. About 2 patients had bile duct injuries with methylene blue, whereas 14 patients had Bile duct injuries without methylene blue. Methylene blue was found to be associated with bile duct injuries (p = 0.0010). We concluded that, when biliary mapping with methylene blue is performed during laparoscopic cholecystectomy, extra hepatic biliary apparatus is stained and visible. As a result, trainee surgeons are more prepared to understand the usual shape and variations of the biliary tree as well as the blood arteries that supply it. So that the trainee surgeons may carefully dissect Calot's triangle put clips over the cystic duct and artery without harming them and do so at the proper time to prevent lengthening the operation's duration. Switching from laparoscopic to open surgery is also extremely unusual with methylene blue biliary mapping. As a result, using methylene blue for biliary mapping during laparoscopic cholecystectomy may reduce the likelihood of common bile duct injuries.

OPEN ACCESS

Key Words
Cholecystectomy, CBD, common bile duct, complications

Corresponding Author
Sayak Roy,
Department of General Surgery, Siliguri District Hospital, India

Author Designation
[1,2]Senior Resident

Received: 1 August 2023
Accepted: 17 August 2023
Published: 18 August 2023

Citation: Susavan Das and Sayak Roy, 2023. A Comparative Study of Bileduct Injuries During Laparoscopic Cholecystectomy With and Without Biliary Mapping Using Methylene Blue. Res. J. Med. Sci., 17: 933-936, doi: 10.59218\makrjms.2023.933.936

INTRODUCTION

In general surgical practise, bile duct injuries are the third most prevalent type of damage. It is frequently linked to a higher rate of death and morbidity. It has a lower morbidity if detected early and treated promptly.

The incidence has increased after the introduction of laparoscopic cholecystectomy. When new surgical methods were developed, however, the incidence dropped to 0.3-0.6%, compared to 0.125% in the open. IOC, the gold standard for safe cholecystectomy, advanced new generation laparoscopic equipment, dye cholangiography and other advances in laparoscopic cholecystectomy reduce the risk of bile duct injury.

Laparoscopic cholecystectomy (LC) is the most common operation on the digestive tract. Many studies have revealed that with the introduction of laparoscopy, the use of cholecystectomy has increased[1]. Between 1991 and 1997, resident's experience with LC grew by 64%, while the rate of open cholecystectomies performed by residents decreased by 63%[2]. Concurrently, it has been extensively proven that as the use of LC increased, so did the number of bile duct injuries. According to a statewide audit, the number of bile duct repairs nearly tripled between 1988 and 1992[3]. The term "learning curve" was coined in response to research indicating a higher likelihood of biliary injury after a surgeon's initial encounter with LC[4,5].

The majority of surgeons learned LC in 1-3 day postgraduate courses and regularly used it in their practises without supervision. Proctoring was not necessary, despite being indicated. As a result, during the first few procedures, many surgeons became anatomically confused, accidentally transecting the bile duct early in the dissection. Although many early biliary injuries were clearly the result of inexperience, it is discouraging that continuing reports of an increased rate of bile duct injury attest to a problem that has not gone away[6].

Despite recent research indicating that residency training in LC is associated with excellent outcomes, residents commonly reported longer operating durations for LC[7]. According to recent reports, residents are now performing LC with the same safety and efficiency as their attendings, even in patients who are less healthy than those who were previously operated on laparoscopically[8]. Although, these findings suggest that residency training may improve surgical outcomes for LC residents when they enter practising, this has yet to be validated.

Technical problems that contribute to biliary injury are frequently caused by perceptual errors during dissection in Calot's triangle such as misidentification of anatomy and failure to recognise lesions when they occur[9]. Furthermore, acute cholecystitis, difficult dissection and haemorrhage are linked to an increased risk of severe bile duct damage during LC[10].

MATERIALS AND METHODS

Primary objectives: To reach judgments on the incidence of bile duct damage after laparoscopic cholecystectomy with and without biliary mapping using methylene blue.

Eligibility criteria:

- **Inclusion criteria:**
  - Patients who arrive with stomach discomfort are evaluated by USG abdomen, LFT and OGD and are then diagnosed at Kalimpong district hospital with cholelithiasis
  - Individuals who are suitable candidates for laparoscopic cholecystectomy
  - Patients gave their permission to participate in the trial using the approved proforma

- **Exclusion criteria:**
  - Patient with acute cholecystitis-like symptoms
  - Patient unsuited for laparoscopic surgery due to cardiac and pulmonary conditions
  - Pregnant women, patients under the age of 12
  - Patient did not provide permission for research participation

Methods: In this study, the patients who presented with stomach discomfort and were found to have cholelithiasis and be suitable for laparoscopic cholecystectomy.

After receiving consent, a questionnaire will be completed to gather information about the patient's demographics, disease duration, dietary habits, co-occurring conditions, medication history and past medical history.

Study place: Department of general surgery, Kalimpong district hospital.

Study design: This is a comparative study. About 100 patients are chosen divided in to two groups each comprising 50 people. One groups is followed up with lap cholecystectomy without using methylene blue. Another group is followed with lap cholecystectomy with using methylene blue.

Study duration: May 2021 to April 2022.

RESULTS

In with methylene blue, 6 patients were under 30 years old, 20 were between 31 and 45 years old, and 24 were over 45 years old. Without methylene blue, 6 patients were under 30 years old, 28 patients were between 31 and 45 years old and 16 patients were beyond 45 years old. The relationship between age and methylene blue was not statistically significant ($p = 0.2306$). There were 20 male patients and

Table 1: Association between age vs methylene blue

Characteristics	With methylene blue	Without methylene blue	Total	p-value
Age				
<30	6	6	12	0.2306
31-45	20	28	48	
>45	24	16	40	
Total	50	50	100	
Sex				
Male	20	18	38	0.6803
Female	30	32	62	
Total	50	50	100	

Table 2: Distribution of mean operative time with methylene blue

Operative time	Mean	Standard deviation	p-value
With methylene blue	62.02	4.413	<0.001
Without methylene blue	94.01	6.521	

Table 3: Association between Lap to open conversion, Bile duct Injuries and Bleeding complications Vs. Methylene blue

Characteristics	With methylene blue	Without methylene blue	Total	p-value
Lap to open conversion				
Yes	2	16	18	0.0002
No	48	34	82	
Total	50	50	100	
Bile duct Injuries				
Yes	2	14	16	0.0010
No	48	36	84	
Total	50	50	100	
Bleeding complications				
Yes	2	16	18	0.0002
No	48	34	82	
Total	50	50	100	

30 female patients in the methylene blue group and 20 male patients and 30 female patients in the non-methylene blue group. The relationship between sex and methylene blue was not statistically significant (p = 0.6803) (Table 1).

The mean operative time of the patients in with methylene blue was 62.02 4.413. Without methylene blue, the patient's mean operative time was 94.01 6.521. The mean operative time distribution vs. group was statistically significant (p = 0.001) (Table 2).

Lap to open conversion occurred in 2 patients treated with Methylene Blue and 16 patients treated without Methylene Blue. Methylene Blue had a statistically significant (p = 0.0002) association with lap to open conversion. 2 patients had Bile duct injuries with Methylene Blue, whereas 14 patients had Bile duct injuries without Methylene Blue. Methylene Blue was found to be associated with bile duct injuries (p = 0.0010). With Methylene Blue, 2 patients experienced bleeding issues, while 16 patients experienced bleeding complications without Methylene Blue. Methylene Blue was associated with bile duct injuries, which was statistically significant (p = 0.0002) (Table 3).

DISCUSSIONS

The study included 100 patients who were admitted to our Kalimpong District Hospital with cholelithiasis-related complaints. They are divided into two groups of 50 patients each. In one group, a laparoscopic cholecystectomy with biliary mapping using methylene blue was performed. Another group received laparoscopic cholecystectomy without methylene blue biliary mapping as a follow-up. The findings are being addressed in this section.

The bulk of the participants in the study were between the ages of 31 and 45.Only six patients under the age of 30 were chosen. Females outnumbered males in the population.

The average surgical time for patients who had biliary mapping was 62.02 min. Those who did not have biliary mapping underwent the surgery in 1 1/2 hours. The p-value is 0.001.

One patient was converted from laparoscopy to open surgery out of 50 who underwent biliary mapping surgery. In the absence of methylene blue, 16 patients out of 50 were converted from laparoscopic to open surgery. The p-value is 0.0002.

One of the 50 patients in the methylene blue group developed CBD damage. In the absence of methylene blue, 14 patients out of 50 were injured by CBD. The p-value is approximately 0.0010.

One patient in the methylene blue group out of 50 suffered bleeding issues due to iatrogenic blood vessel injury. In the absence of methylene blue, 16 of 50 individuals experienced bleeding problems. The p-value is 0.0002.

CONCLUSION

This work has established that extra hepatic biliary apparatus are stained and noticeable when biliary mapping using methylene blue is performed during laparoscopic cholecystectomy. As a result, trainee surgeons are better equipped to comprehend the

typical structure of the biliary tree and its variations, as well as the blood arteries that supply them. So, that the trainee surgeons can do a careful dissection of Calot's triangle, attach clips over the cystic duct and artery without damaging them, and do so at the appropriate moment to avoid extending the duration of the operation. The likelihood of switching from a laparoscopic to an open surgery is likewise quite unlikely with methylene blue biliary mapping. Therefore, utilizing biliary mapping with methylene blue during laparoscopic cholecystectomy might reduce the occurrence of Common bile duct injuries.

REFERENCES

1. Orlando, R., J.C. Russell, J. Lynch and A. Mattie, 1993. Laparoscopic cholecystectomy: A statewide experience. Arch. Surg., 128: 494-499.
2. Parsa, C.J., C.H. Organ and J.H. Barkan, 2000. Changing patterns of resident operative experience from 1990-1997. Arch. Surg., 135: 570-573.
3. Rutledge, R., S.M. Fakhry, C.C. Baker and A.A. Meyer 1996. The impact of laparoscopic cholecystectomy on the management and outcome of biliary tract disease in North Carolina: A statewide, population-based, time-series analysis. J. Am. Coll. Surg., 183: 31-45.
4. Deziel, D.J., K.W. Millikan, S.G. Economou, A. Doolas, S.T. Ko and M.C. Airan, 1993. Complications of laparoscopic cholecystectomy: A national survey of 4,292 hospitals and an analysis of 77,604 cases. Am. J. Surg., 165: 9-14.
5. SSC., 1991. A prospective analysis of 1518 laparoscopic cholecystectomies. N. Engl. J. Med., 324: 1073-1078.
6. Windsor, J.A. and J. Pong, 1998. Laparoscopic biliary injury: More than a learning curve problem. Anziam J. Surg., 68: 186-189.
7. Ferzli, G.S., M.A. Fiorillo, N.E. Hayek and F. Sabid, 1997. Chief resident experience with laparoscopic cholecystectomy. J. Laparoendoscopic Adv. Surg. Tech. A., 7: 147-150.
8. Wu, J.S., D.L. Dunnegan, D.R. Luttmann and N.J. Soper, 1998. The evolution and maturation of laparoscopic cholecystectomy in an academic practice. J. Am. Coll. Surg., 186: 554-561.
9. Stewart, L. and L.W way, 1995. Bile duct injuries during laparoscopic cholecystectomy. Arch. Surg., 130: 1123-1128.
10. Davidoff, A.M., T.N. Pappas, E.A. Murray, D.J. Hilleren and R.D. Johnson *et al*., 1992. Mechanisms of major biliary injury during laparoscopie cholecystectomy. Ann. Surg., 215: 196-202.