Metal Clips Versus Intracorporeal Ligation for Cystic Duct Occlusion in Laparoscopic Cholecystectomy

Osman Riaz, Muhammad Faizan Riaz, Amna Rehan

ABSTRACT

Objectives: To compare frequency of bile leakage and mean time taken in laparoscopic cholecystectomy by using metal clips versus intracorporeal ligation with chromic catgut. **Subject and Method:** It was a randomized controlled study, conducted in department of surgery, Allied hospital Faisalabad. Study was carried from January 2015 to December 2015. A total of 240 patients were included in the study after fulfilling the inclusion criteria and were divided randomly in two groups. The outcome measures were operative time and post-operative complication in terms of bile duct injury**. Results:** A total of 94 females and 26 males got laparoscopic cholecystectomy with intracorporeal ligation while 106 females and 14 males underwent laparoscopic cholecystectomy by using metal clips. Mean age of the patient was 40.3 ± 11.9 years and 38.3± 10.8 years in laparoscopic cholecystectomy with metal clips group and intracorporeal ligation group respectively. Mean operating time in metal clip group was 2.53 ± 0.5 minutes compared to intracorporeal ligation group which was 4.79 ± 1.5 minutes. Bile leakage occurred in 04 patients (3.3%). 03 were male and 01 patient was female. All of the patients belong to metal clip group with a p-value of 0.05 which is statistically significant. **Conclusion:** Intracorporeal ligation in laparoscopic cholecystectomy is safe and can manage all kinds of cystic duct.

Keywords: Laparoscopic Cholecystectomy, Intracorporeal ligation, Cholelithiasis

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INTRODUCTION

Gallstone disease is the most common pathology of biliary tract. It is a major health problem not only in Pakistan but also worldwide in adult population.[1] Open cholecystectomy remained the procedure of choice for about hundred years till in 1987 Philip Mouret performed first laparoscopic cholecystectomy in France.[2] Now laparoscopic cholecystectomy is the gold standard for the management of cholelithiasis. It is the commenst performed laparoscopy worldwide.[3]

Compared with open cholecystectomy, laparoscopic cholecystectomy has improved surgical outcome in terms of reduce pain, shorter hospital stay, quicker return of normal activity and improved cosmetic outcome.[4] During laparoscopic cholecystectomy it is important to identify the structures of calots triangle at the time of cystic duct isolation. Cystic duct occlusion can be done with clips, intra or extra corporeal ligation, harmonic scalpel or ligasure.[5] The main pitfall of metal clips are clip failure (dislodge, slippage or migration), bile leakage and common bile duct injury.[7] one reason of bile leakage is laceration of cystic duct by metal clips.[8] This is because of ability of the metal clip to conduct electricity causing a cut in the cystic duct or cause necrosis of clamped tissue.[8] Rarely the metal clips can erode into the cystic duct and migrate into common bile duct. Such migration of clips can act as nidus for stone in common bile duct.[10] These disadvantages limited the worldwide use of metal clips in surgical procedures.[4] Alternative techniques have included the use of absorbable clips and harmonic scalpel. These are, however, more expensive, not readily available and used infrequently.[9] In contrast, these complications are not encountered with open cholecystectomy using thread to ligate the duct.[4]

It is now possible, with increasing experience in advanced laparoscopic technique, to safely occlude cystic duct with ligature as an alternative to clips.[5,6] Therefore purpose of the study was to evaluate the use of ligature as a safe, feasible and cost-effective alternate to metal clips and to compare postoperative outcome in term of bile duct injury after intracorporeal ligation of cystic duct.

METHODOLOGY

A total of 240 cases divided randomly in groups A and B, during the period of January 2015 to December 2015.

Inclusion Criteria: Patients fulfilled inclusion criteria were all patients requiring laparoscopic cholecystectomy for cholelithiasis or cholecystitis. **Exclusion Criteria:** Patients who were jaundiced, growth of gallbladder on ultrasound, patient with midline laparotomy scar and patients in third trimester of pregnancy were excluded from the study. Bile leakage during application of clips/ligature was confirmed postoperatively by crampy, intermittent, 8/10 in severity pain in right upper quadrant abdomen associated with nausea and vomiting within first week and confirmed by ultrasound abdomen. Time taken for ligation of cystic duct and artery was calculated in minutes from start of clipping/ ligation to cutting of cystic duct and artery. All included patients underwent detailed history and basic required investigation for fitness. All the patients were informed that they are part of the study. Procedure was explained to them in detail and informed consent taken from every patient. In group A, the cystic duct was tied by 10 cm long piece of chromic catgut no.1 by making a double squared knot after dissection of cystic duct and artery. A third single squared knot was applied in a similar way on the top of first knot. The excess thread was excised and removed. Another ligature was made in similar way on cystic duct near neck of the gallbladder. The cystic duct was transected in between these ligature. In group B the dissection was made at calot's triangle. Cystic duct and artery was visualized and three clips were applied at cystic duct and one on cystic artery. Both duct and artery were transected. All patients were followed up to six week regarding postoperative complications. Data was collected on specially designed performa and it was entered into SPSS version 20. Mean $\pm$ SD were calculated for patient age and operating time in both groups and compared by applying t-test. Percentages were calculated for qualitative variables like gender and complications (bile duct injuries). Difference in frequency of complication in both procedures were analyzed by applying chi square test. A p-value $\leq$ 0.05 was considered significant.

RESULTS

In a period of one year, 240 patients of cholelithiasis were selected for the study. 120 patients underwent laparoscopic cholecystectomy with ligation of cystic duct and artery by metal clips and 120 were done by using chromic catgut no.1. The number of patients were equal in both groups. 106 females (88.3%) and 14 males (11.7%) got laparoscopic cholecystectomy with intracorporeal ligation of cystic duct and artery while 94 females (78.3%) and 26 males (21.7%) underwent laparoscopic cholecystectomy with ligation of cystic duct and artery by metal clips. The patients in which metal clips were used had a mean age of 40.32 $\pm$ 11.92 years, while in which intracorporeal ligation had a mean age of 38.28 $\pm$ 10.85 years. The mean operating time was 2.53 $\pm$ 0.50 minutes in metal clip group and 4.79 $\pm$ 1.28 minutes for intracorporeal ligation. There was statistically significant difference in operating time in both groups. Bile leakage occurred in 04 patients. Out of them 3 were male and 01 was female. All belong to group B.

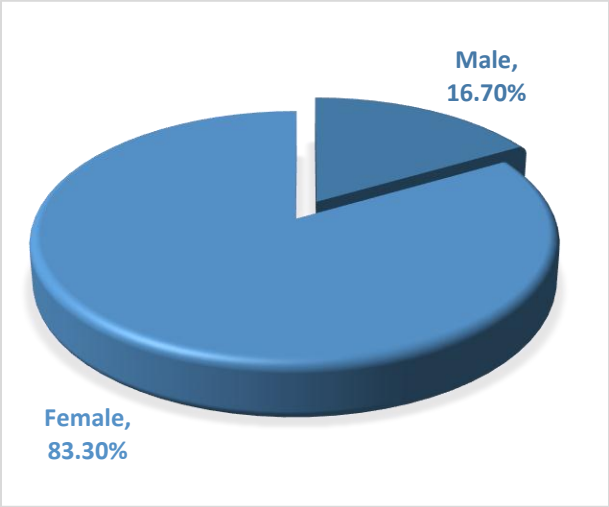

Figure 1: Gender wise distribution

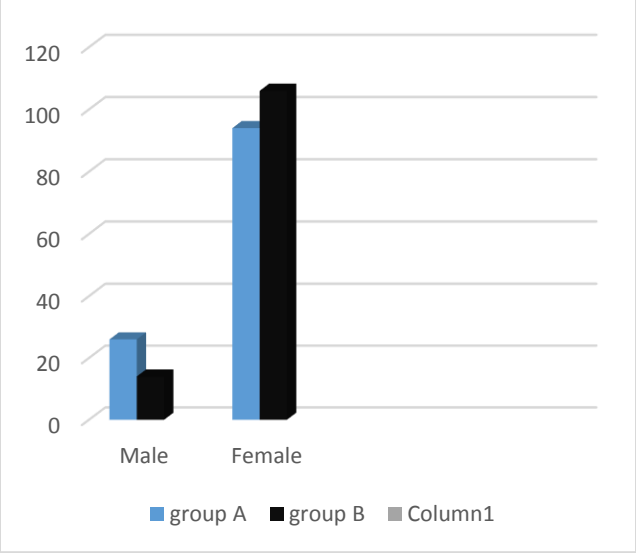

Figure 2: Male to female ratio in both groups

Table 1: Operation time group statistics

Groups	Mean	Std. Deviation	Standard Error Mean
A	4.79	1.28	0.12E-02
B	2.53	0.50	4.53

p-Value = 0.00

Table 2: Complications group statistics

GROUPS	BILE LEAKAGE
A	0%
B	4 (3.3%)

Chi-square Value = 4.068
p-value = 0.044

DISCUSSION

Laparoscopic surgery is well established alternative to open surgery across all disciplines. Although positive magnitude of impact varies by the procedure, generally the benefit of laparoscopic surgery on postoperative pain, hospital stay and convalescence are recognized widely. Despite these advantages, various literatures showed multiple complications including clip failure (dislodge, slippage or migration), bile leakage and common bile duct injury.

Many surgeons have attempted to use alternative to non-absorbable clips such as absorbable clips, locking clips, absorbable knots or more recently harmonic scalpel for cyst duct occlusion.

So far, many studies are available which favor use of knots over clips in term of safety, feasibility and cost effectiveness. In my study, 240 patients undergoing laparoscopic cholecystectomy were taken and divided in two groups randomly. In group A, intracorporeal ligation was done for cystic duct occlusion while in group B metal clips were used.

The main aim of this study was to compare frequency of bile leakage and mean time taken in laparoscopic cholecystectomy by using metal clips vs intracorporeal ligation. There was 3.3% bile leakage in group B while no case (0%) in group A. The result of my study regarding bile leakage was comparable with the study done by Talebpour M and Panahi M.[11] That study concluded that ligation by suturing is effective in decreasing the risk of bile duct trauma and bile leakage.

The result of my study are further supported by study done by Rajra A et al[8] in MMU Hospital India. Bile leakage was 6% in clip group vs 3% in knot group. In a study conducted in Fort Prajaksi lapakoun hospital, Thailand by Jongsiri N[7] showed that intracorporeal ligation in laparoscopic cholecystectomy was feasible, economical and safe and could manage all kinds of cystic duct.

Saha SK[12] reported that there was not a single case of postoperative morbidity in patients where cystic duct was ligated in laparascopic cholecystectomy. He concluded that cystic duct ligation with absorbable thread should be gold standard in laparascopic cholecystectomy as it reduces postoperative morbidity.

However, Seenu V et al[13] concluded that there is no significant difference regarding post-operative bile leakage in both groups.

The mean time taken in group A was 2.53 minutes and in group B was 4.7 minutes. The main cause of time difference between two groups were surgical expertise. Golash V.[14] and PK Saha [5] et al discussed that mean time taken for cystic duct ligation by intracorporeal knotting was 3.5 minutes and there was no case of bile leakage in cystic duct ligation or other related complications.

In Glasgow Uk, Marane A et al[15] took 2-8 minutes with mean time of 4.03 minutes by intracorporeal ligation. They suggested to improve the training skills necessary for intracorporeal knots. The result of this study was comparable to that of mine.

It is suggested in this study that expertise in intracorporeal ligation can reduce the time of surgery. Jongsiri N[7] in his study concluded that using intracorporeal ligation technique, surgeon should have sufficient experience to do so.

CONCLUSION

It is suggested that intracorporeal suturing is better option for difficult cases in terms of reducing postoperative morbidity but for this technique surgeon should have sufficient expertise to do intracorporeal ligation by practicing in endobox first.

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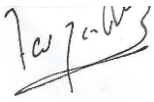
Dr. Muhammad Faizan Riaz Medical Officer, Surgery Riaz Hospital, Faisalabad	Reference collection	
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