

Research Article

Status of clipless laparoscopic cholecystectomy in a tertiary care hospital of Nepal: A descriptive cross-sectional study

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ABSTRACT

Background & Objectives: In this modern age, the preferred course of treatment for gallstone disease symptoms is laparoscopic cholecystectomy. For securing both the cystic duct and artery with a single ligation (SLAD), is a quicker and safe procedure. The study was aimed to determine the status of clipless laparoscopic cholecystectomy in a tertiary care hospital of Nepal.

Materials and Methods: A total of 205 patients with gallstone, who underwent laparoscopic cholecystectomy at tertiary center of Nepal of age group 16 - 70 years were included. During the procedure the cystic duct and artery was tied with single ligation. Data were subjected to Microsoft excel 16 for analysis.

Results: Laparoscopic cholecystectomy was performed in 205 patients with gallstone. Average age of patients was 31.54 yrs. There was female predominance in the study. The cystic duct and artery were tied in single ligation using nonabsorbable Silk 2-0. The mean time taken for ligation was 120.78 ± 26.92 seconds. Bile leakage and intra-op bleeding were found in two patients without any mortality.

Conclusion: In laparoscopic cholecystectomy, a viable and secure alternate technique for securing the cystic artery and duct is single ligation with the use of nonabsorbable thread. Even though it is a common procedure, it has an additional benefit over clips when dealing with thick, edematous cystic artery and duct complexes. It lowers the threat of surgical morbidity and does not increase the intra operative time.

Keywords: clipless laparoscopic cholecystectomy, cystic artery, cystic duct, gallbladder

INTRODUCTION

Laparoscopic Cholecystectomy is treatment of choice for patients with symptomatic cholelithiasis as it is simple, safe and economical [1,2]. A variety of its benefit over open procedure, laparoscopy has completely changed the surgical profession. Over the years, improved ergonomic research, novel energy sources and endoscopic suturing have significantly improved the recently developed laparoscopic cholecystectomy [3].

Several techniques like titanium clips, intra and extra corporeal ligation, harmonic scalpel, Ligasure have been used to secure cystic duct and cystic artery in laparoscopic Cholecystectomy [4,5]. When it comes to determine the right tension without running the risk of severing tissue, intracorporeal knotting performs better than extracorporeal knotting. Similar to LigaSure, the more sophisticated harmonic scalpel is pricey for developing nations like Nepal. [5] Furthermore, it will expand the use of laparoscopic surgery beyond standard LC by developing proficiency in intracorporeal knotting [6].

This study was aimed to determine the status of clipless laparoscopic cholecystectomy in a tertiary care hospital of Nepal. The operational time, total postoperative problems, conversion to open surgery, and unintentional gall bladder perforation during surgery were all assessed as secondary outcomes, with bile leakage being the major outcome.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted among patients presenting to the Department of Surgery of a medical college of

Nepal, from January 2023 to December 2023. After obtaining the clearance from the Ethical committee of IRC (IRC/26/2079-80), Janaki Medical College and Teaching Hospital, all the patients with gallstone who underwent Laparoscopic cholecystectomy were included for study. Patients with age group of 16-70 years of male and female were included for the study. The patients were diagnosed with the presence of gallstones by the use of ultrasonography or computed tomography scan, and then they were explained about the study detail. They were assured of confidentiality and informed written consent was taken. Those with Cholangitis, choledocholithiasis, gallbladder tumor and other gallbladder diseases were excluded from the study. Patients with comorbid conditions like pregnancy were also excluded from the study.

All patients with cholelithiasis underwent laparoscopic cholecystectomy by a single surgeon. Among different techniques of ligation of cystic duct and cystic artery, intracorporeal knotting was used as it is thought to be superior to extracorporeal knotting specially in assessing appropriate tension without risk of cutting through tissues. Intracorporeal "single ligation of cystic duct and cystic artery" using silk 2-0 was done. The time taken for tying and bile leak or other complications were noted. Handling care and cost of the silk was also accessed.

This case series were performed in the Department of Surgery at Janaki Medical College and Teaching Hospital, Janakpur by single surgeon from Jan 2023 to Dec 2023. Three 5 mm working ports and one 10 mm umbilical port for the 30° Telescope were the four ports we used in our technique. To apply the proper amount of strain on the

Hartmann's pouch and cystic duct, the GB was grabbed at the fundus using a grasper that was passed through the port at the right mid-axillary line. Hartmann's pouch was maintained in place using a second grasper grasped in the left hand through a 5 mm port at the right anterior axillary line.

The calot's triangle was carefully skeletalized, and the cystic duct and artery were correctly identified using Maryland's forcep, which was inserted through the epigastric 5mm port. All the 205 patients undergoing laparoscopic cholecystectomy (LC) with symptomatic cholelithiasis were effectively treated with intracorporeal single ligation of the cystic artery and cystic duct (SLAD). A 7-8cm Silk 2-0 was grasped in the grasper with the end of the tie sticking out of the jaw by about 1 cm. The knot was placed through the window formed behind the cystic duct using a Maryland forceps that went through the epigastric port.

Using a dissector that was inserted through the third port, the projecting end of the tie was grabbed. Two over-wraps were made over the Maryland forcep's tip while the grasper grasped the long arm of the inverted C-loop. At a distance of 0.5 to 1 cm from the junction to the common bile duct, the short-free end of the suture was gripped by the Maryland forceps and pulled in opposite directions to form a square knot. The SLAD was completed by looping the long arm of the suture around the Maryland forceps to form the second and third square knots.

When dissecting the GB, the grasper is utilized to move at the various angles necessary to achieve the proper tension. GB was taken out via an epigastric port or umbilical port as feasible under direct vision after it get released from the liver bed,

assisted by a grasper that was locked at Hartman's pouch. Silk 2-0 is used to close all four ports without separately fixing the fascial layer.

Similar to standard LC, postoperative care involved commencing oral liquids 4-6 hours after surgery and discharging patients on the same day to second POD. Fewer post-operative bile leak patients required longer hospital stay without additional interventions. Patients were called back after one week for their first OPD appointment for the suture removal. Subsequently asked for a follow-up after two weeks for the HPE report and a post-operative follow-up. The data obtained was entered into Microsoft Excel 2016 and subjected to statistical analysis and calculated. Values were expressed as mean T standard deviation.

RESULTS

In the present study, a total of 205 patients with gallstone who underwent laparoscopic cholecystectomy were included with age group of 16-70 years with mean age 31.54 ± 9.94 . Among them there was female predominance over male, shown in Table 1.

Table 1: Baseline characteristics of patients

Variable	Number (%)
Total patients (n)	205
Male	12 (6)
Female	193 (94)
Mean age (Years)	31.54

The mean time taken for single ligation of cystic artery and duct was 120.78 ± 26.92 secs with a minimum of 60 secs to maximum of 300 secs, while the mean intra operative time taken was 33.26 ± 16.75 minutes with a minimum of 15 minutes to maximum of 140 minutes. The patients started their post-

operative oral diet after 6 to 12 hours with mean duration of 6.28 ± 1.21 hours. Similarly, the mean duration of hospital stay after cholecystectomy was 2.097 ± 0.96 days with a minimum of 1 day to maximum of 12 days particularly in those patients with complications. There was one case which was converted into open cholecystectomy and all gallbladders were removed intact from liver bed (Table 2)

Table 2: Operative status of patients

Variables	Mean Duration	SD
Mean time taken for SLAD (sec)	120.78 (60-300)	26.92
Mean intra-op time (min)	33.26 (15-140)	16.75
Postop time for oral diet (hr)	6.28 (6-12)	1.21
Hospital Stay (Days)	2.097 (1-12)	0.96

Table 3: Complications of the surgery

Complications	Number (%)
Intra-op bleeding	2 (0.97)
Post-op bleeding	Nil
Bile leakage	2 (0.97)
Omental Protrusion from umbilical port site after suture removal	1 (0.49)
Port site infection	Nil
Mortality	Nil

In the present study the material used for tying cystic duct and cystic artery was Silk 2-0 and for umbilical port (Mass closure) closing Silk was used. During cholecystectomy only two (0.97%) patients had intra-operative bleeding and there was no post-operative bleeding in any patients. Out of 205 laparoscopic cholecystectomy two (0.97%) patients had bile leakage and one patient experienced omental protrusion from

umbilical port site after removal of suture. There was no port site infection with no mortality (Table 3).

Out of 205 patients, 9(4.39%) suffered from hypertension, 9 (4.39%) had hypothyroidism and only 2(0.97%) had umbilical hernia (Table 4).

Table 4: Comorbidities of Patients

Comorbidities	Number (%)
Hypertension (HTN)	9 (4.39)
Diabetes	4 (1.95)
Dypothyroidism	9 (4.39)
COPD	3 (1.46)
Umbilical hernia	2 (0.97)
None	178 (86.83)

DISCUSSION

The most frequent elective surgery that general surgeons perform worldwide is cholecystectomy. Laparoscopic surgery has long been recognized as a reliable substitute for open surgery in all professions. The first Laparoscopic cholecystectomy was conducted in 1985 by Prof. Dr. Erich Muhe, a German physician. Ever since, this method has been regarded as the "gold standard" for managing symptomatic gallbladder disease [7].

In the beginning, LC significantly increased morbidity, especially iatrogenic biliary damage and arterial hemorrhage. The surgeon must therefore execute cautious dissection and use his in-depth knowledge of the anatomy of Calot's triangle in order to prevent damage to the extrahepatic biliary tree [8,9]. Prior to division, the cystic duct and cystic artery must be ligated in order to stop bile leakage and hemorrhage during laparoscopic cholecystectomy [7]. This is the most crucial stage in a laparoscopic cholecystectomy to secure the cystic duct and

artery. For the same, a variety of methods are used, including LigaSure, harmonic scalpel, clips, and intra or extracorporeal ligation [10]. Equipment costs are now the primary deterrent. For safety reasons, it is not advised to use these tools while dividing a cystic duct that is larger than 6 mm in diameter. Damage to the intestines and bile ducts are further related hazards of these equipment [11].

The present study conducted on 205 patients with gallstone who presented to the surgery department and underwent laparoscopic cholecystectomy. The patients were of age group 16-70 years with mean age 31.54 ± 9.94 , with female predominance over male.

Intracorporeal knot tying has the potential to advance laparoscopic operations. According to other studies, it also lowers surgery costs by eliminating clips without sacrificing effectiveness or safety. In contrast to clipping, the majority of reports of suture ligation involve separate and multiple ligatures for the cystic duct and artery, which takes more time. We have effectively demonstrated the safety, security, and viability of a single artery and duct ligation. In the present study, the meantime taken for single ligation of cystic artery and duct was 120.78 ± 26.92 secs with a minimum of 60 to maximum of 300 secs. While the mean intra operative time taken was 33.26 ± 16.75 minutes with a minimum of 15 minutes to maximum of 140 minutes.

Saha et al conducted a study in Medical college of Bangladesh, found similar results with the present study showing 2 to 4 minutes (average 3 min) time for tying of the cystic duct and artery [12]. Which was also supported with longer time taken compared to present study, by Anandaravi BN, in a study of 40 patients with symptomatic

gallstone, the time taken for tying varied from 2.5 to 8 minutes (average 3.5min) [10].

The patients started their post-operative oral diet after 6 to 12 hours with mean duration of 6.28 ± 1.21 hours. Similarly, the mean duration of hospital stay after cholecystectomy was 2.097 ± 0.96 days with a minimum of 1 day to maximum of 12 days particularly in those patients with complications. There was one case which was converted into open cholecystectomy and all gallbladders were removed intact from liver bed.

In the present study the material used for tying cystic duct and cystic artery was non-absorbable silk 2-0 and same suture was used to close all ports. In the study, successful use of cystic duct and artery intracorporeal ligation without any reported incidence of problems such as cystic artery or cystic duct injury with a minimal bile leakage, or right hepatic artery injury is in line with findings from other research [13].

Research has indicated that up to 3.9% of patients with clips experience bile leakage from their cystic duct. Numerous factors, such as mismatched clip arms that prevent the duct from closing completely, duct necrosis at the clipping site, or the clips slipping and migrating into the biliary tract, could be responsible for this. Clip-related difficulties are avoided using SLAD [14].

In this study only two (0.97%) patients had intra- operative bleeding and there were no post-operative bleeding complications in any patients. Out of 205 laparoscopic cholecystectomy, two (0.97%) patients had bile leakage and one patient experienced omental protrusion from umbilical port site after removal of suture. Bile leak after ligation

may happen in as many as 3.8% of cases, according to studies [15]. In the present study, drain was kept and bile leakage was observed in 2nd post-operative day. Patient had no other complaints. By monitoring the drain flow and observing out for peritonitis symptoms, we cautiously handled them. Spontaneously the leakage disappeared by 8-9 postoperative day.

There are several ways to treat bile leaks, including by observing, open laparotomy, percutaneous drainage, Endoscopic retrograde cholangiopancreatography, and ductal decompression [16, 17]. There was no infection at port site and with no mortality, however some patients suffered from comorbid conditions like hypertension and hypothyroidism in 4.39%, diabetes mellitus in 1.95%, COPD in 1.46% and umbilical hernia in 0.97%. Patients with diabetes mellitus often have impaired gallbladder movement, which increases the occurrence of gallstones [18].

Laparoscopic cholecystectomy has been the standard for treatment since its introduction and subsequent popularity because of its benefits, which include lower costs, shorter hospital stays, and improved satisfaction among patients.

Our research had some limitations, as it was a single-centered study in patients coming to the surgical department tertiary care hospital of Nepal with no extended follow-up. Hence, it cannot be generalized to all surgical departments of different tertiary hospitals. It is also challenging to extrapolate the outcome on a national level. Furthermore, an observational study with control group can be done.

CONCLUSION

In laparoscopic cholecystectomy, 'single ligation of artery and duct' with intracorporeal knotting is safe and much feasible to use. It has the benefits over clipping of cystic duct in operative cost and lesser intraoperative complications, without increase in operative time.

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