Laparoscopic Cholecystectomy with Extracorporeal Sliding Knot using Knot Pusher: A Retrospective Study at Mae Fah Luang University Medical Center Hospital

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Abstract:

Background: The cystic duct and vessels ligation are critical step in laparoscopic cholecystectomy. Various techniques, including clips and knot-tying methods, have been developed to enhance the safety and efficacy of this ligation process.

Objective: This retrospective study endeavors to meticulously examine the efficacy of laparoscopic cholecystectomy performed using the extracorporeal sliding knot technique facilitated by a knot pusher in patients presenting with symptomatic gallstone diseases.

Method: A retrospective analysis of electronic medical records was conducted for cases of laparoscopic cholecystectomy (LC) performed using the extracorporeal sliding knot technique using knot pusher at Mae Fah Luang University Medical Center Hospital between July 2020 and July 2023. Data on patient demographics, surgical time, hospital stay, and postoperative complications were extracted and analyzed.

Results: The study revealed 118 patients, 29 were male (24.6%) and 89 were female (75.4%). The median age was 55.2 years, with a range of 23 to 85 years. The average surgical time was 20 minutes, with a range of 15 to 55 minutes. The average blood loss was 16 mL, with a range of 5 to 120 mL. The average hospital stay was 1.5 days, ranging from 1 to 4 days. Consist with 35% of co-medical diseases which hypertension the most common. No surgical complications were observed in any of the cases.

Conclusion: Laparoscopic cholecystectomy with the extracorporeal sliding knot technique offers an efficient and safe alternative for cystic duct and vessel ligation during gallbladder surgery.

Keywords: Laparoscopic cholecystectomy, Extracorporeal sliding knot technique, Knot pusher

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Introduction

Laparoscopic cholecystectomy has become the preferred approach for managing gallbladder diseases due to its numerous advantages over open surgery. Cystic duct leakage is reported in 0.5 - 3% of patients following LC.[1,2] The safe ligation of the cystic duct and vessels is a critical step in this procedure.[3-5] Various techniques, including clips, knot-tying and vessel sealing devices, have been developed to enhance the safety and efficacy of this ligation process.[6,7] This study focuses on evaluating the effectiveness and safety of the extracorporeal sliding knot technique in LC.

Method

A retrospective analysis of electronic medical records was conducted for 118 cases of LC performed using the extracorporeal sliding knot technique at Mae Fah Luang University Medical Center Hospital between July 2020 and July 2023. Data on patient demographics, surgical time, hospital stay, and postoperative complications were extracted and analyzed.

Results

This retrospective study evaluated the outcomes of LC with extracorporeal sliding knot using knot pusher technique at Mae Fah Luang University Medical Center Hospital from July 2020 to July 2023. The study revealed the excellent outcomes for LC using knot pusher. Of the 118 patients, 29 were male (24.6%) and 89 were female (75.4%) as in Table 1. The median age was 55.2 years, with a range of 23 to 85 years. The average surgical time was 20 minutes, with a range of 15 to 55 minutes as in Table 2. The average blood loss was 16 mL, with a range of 5 to 120 mL. The average hospital stay was 1.5 days, ranging from 1 to 4 days. The co-medical diseases were 35% of the population studied. They consisted with hypertension, diabetes, COPD (Chronic obstructive pulmonary disease), CKD (Chronic kidney disease), and BPH (Benign prostatic hyperplasia). No surgical complications were observed in any of the cases. Among the cases, 32 were One Day Surgery (ODS) cases, and no surgical complications were observed.

Subgroup Analysis: One Day Surgery

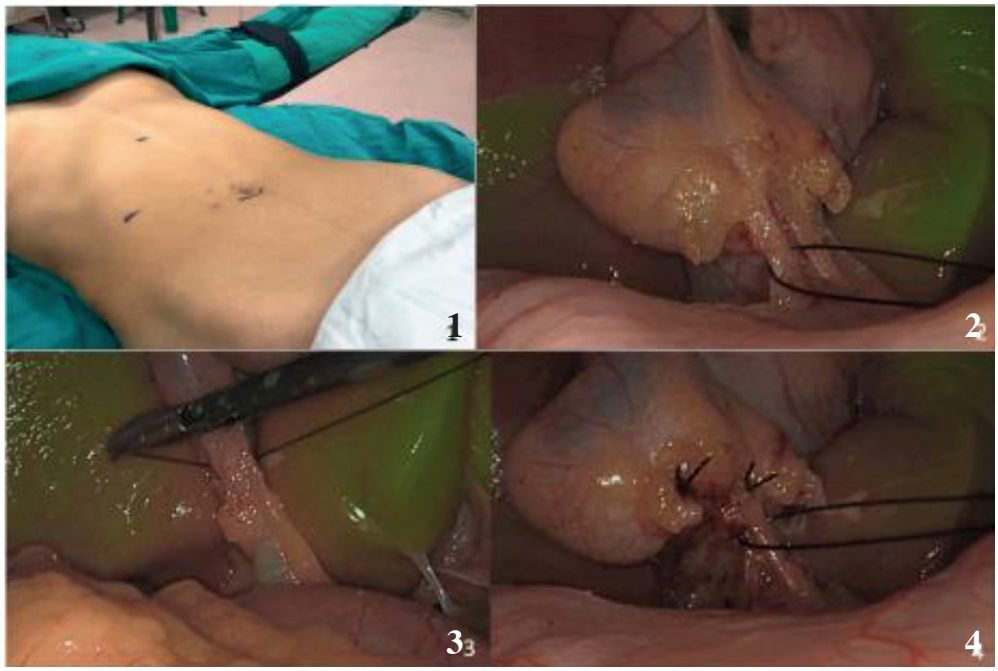
Among the 118 cases, 32 patients presented One Day Surgery (ODS). The surgical outcomes for this subgroup were consistent with those of the overall cohort, with no observed complications.

Table 1 Demographic Data

Demographics	N (%)
Gender	
Male	29 (24.6)
Female	89 (75.4)
Age	Mean 55.2 Range 23-85
Co-morbidity	41 (35.7%)
Hypertension	35 (29.6%)
Diabetes	24 (20.3%)
COPD	18 (15.6%)
CKD	12 (10.1%)
BPH	5 (4.2%)
Previous abdominal surgery	5
Midline	3
Lateral	2

Table 2 Clinical Data

Operation time	Mean 20 min (Range 15-55)
Blood loss	Mean 16 mL (Range 5-120)
Hospital stay	Mean 1.5 day (Range 1-4)
One Day Surgery	32 cases (27.1%)



Highlight the Steps of Procedure

Figure 1 Three ports; 10 mm. 2 × 5 mm, all ports site were infiltrated with local anesthesia
Figure 2 Identify critical view of safety
Figure 3 The cystic duct and vessels were loop with Nylon No.2
Figure 4 A sliding knot was tied extracorporeally, then push inside abdominal cavity with my designed Knot Pusher

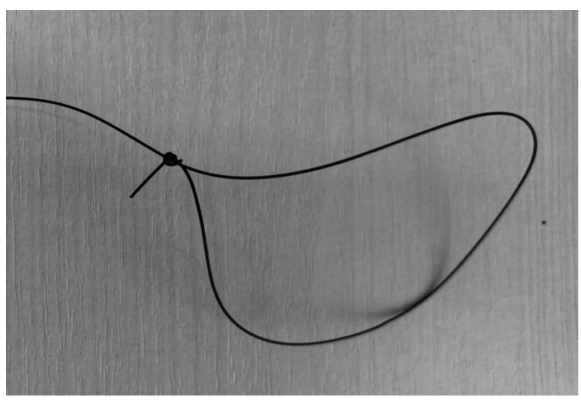


Figure 5 A sliding knot

Discussion

Within the realm of sliding knot tying techniques, I favor the application of a straightforward slip knot, demonstrated in Figure 5. This method exhibits exceptional efficacy in securely ligating the cystic duct and its associated vessels across a spectrum of clinical scenarios. The intrinsic value of employing extracorporeal knot ligation becomes particularly apparent in cases characterized by a substantial cystic duct diameter, where alternative approaches to duct ligation may prove arduous to implement with the desired level of confidence. It is imperative to exercise utmost caution when

ligating ducts that exhibit inherent fragility, susceptible to inadvertent disruption. In such instances, it is prudent to explore alternative options to ensure the durable and secure ligation of such delicate ducts.

Laparoscopic cholecystectomy has become the gold standard for gallbladder surgery due to its superior outcomes in terms of hospitalization duration, cost-effectiveness, and patient satisfaction compared to open surgery.[8] Ligation of the cystic duct and vessels demands utmost precision and safety. The extracorporeal sliding knot technique offers several advantages, including simplicity, ease of execution, and comparable stability and safety to other ligation methods involving clips.[9] This technique involves extracorporeally tying a knot and then pushing it down using a specialized knot pusher device, avoiding the complexity associated with intracorporeal knot tying methods.[10-14] The average surgical time of 20 minutes is in line with established standards for LC, indicating efficient procedures at our Medical Center. Additionally, the average hospital stay of 1.5 days reflects effective postoperative care and patient recovery.[15-18] Absence of complications in all cases highlights the proficiency of the surgical team and adherence to established protocols. The shortened hospital stay contributes toimproved patient recovery and cost-effectiveness.

Limitation

This study's limitations include its retrospective nature, which may lead to potential data inaccuracies and missing information. The single-center design may limit the generalizability of the findings.

Conclusion

Laparoscopic cholecystectomy with extracorporeal sliding knot using knot pusher technique offers an efficient and safe alternative for cystic duct and vessels ligation during gallbladder surgery. Our study at Mae Fah Luang University Medical Center Hospital demonstrated promising outcomes with reduced surgical time and hospital stay, contributing to enhanced patient satisfaction and cost-effectiveness. This technique holds significant potential as a standard method in laparoscopic cholecystectomy, benefiting patients and medical professionals alike. Further research and long-term follow-ups are warranted to validate and consolidate these findings.

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