

Clipless Laparoscopic Cholecystectomy: Our Experience At A Tertiary Care Hospital

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Abstract

Background: Securing the cystic duct and artery is the most important step in laparoscopic cholecystectomy. Several techniques are followed for the same, such as clips, intra or extra corporeal ligation, harmonic scalpel, LigaSure etc. Intracorporeal ligation has the advantage of using standard knotting method, without the need for extracorporeal knot creation, pushing device, accessing appropriate tension without the risk of cutting through the tissue and the ability to secure knot in difficult locations. Single ligation of cystic artery and duct (SLAD), as No clip laparoscopic cholecystectomy (NCLC) is time saving, as both the duct and artery are secured in a single ligature.

Methods: Since September 2018 to February 2019, we used intracorporeal single ligation of cystic artery and duct in 40 patients with symptomatic Gall bladder stones undergoing Laparoscopic cholecystectomy (LC). Patients were discharged on 1st or 2nd postoperative day and followed up in our outpatient department on 5th or 6th postoperative day. The 2nd outpatient visit was 8-10 days later for suture removal and to review histopathology report.

Results: We performed SLAD in 40 patients with symptomatic Gall bladder stones. Patients were in the age group of 17-60 yrs. Average age was 45yrs. There was a slight Female predominance with 24 out of 40 (60%). We were able to tie the cystic duct and artery in single ligature. We had no bleeding complications. The mean time taken for ligation was 3.5min..

Conclusions: Single ligation of cystic artery and duct is feasible and safe alternative method to secure cystic artery and duct in laparoscopic cholecystectomy. Although it can be used routinely, it gives an added advantage over clips in cases with thick oedematous cystic artery and duct complex. There is no increase in operating time as only one ligature is used.

Keywords: Cystic duct and artery, Laparoscopic Cholecystectomy, Single ligation of cystic artery and duct, No Clip Laparoscopic Cholecystectomy.

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I. Introduction

Securing the cystic duct and artery is the most important step in laparoscopic cholecystectomy. Several techniques are followed for the same, such as clips, intra or extra corporeal ligation, harmonic scalpel, LigaSure etc. Newer advances such as Harmonic scalpel and LigaSure are expensive. Intracorporeal ligation has the advantage of using standard knotting method, without the need for extracorporeal knot creation, pushing device, accessing appropriate tension without the risk of cutting through the tissue and the ability to secure knot in difficult locations. In this prospective observational study, we have used intracorporeal 'single ligation of cystic artery and duct, as no clip LC. This technique is time saving, as both the duct and artery are secured in a single ligature. The technique and its outcome is discussed in detail.

II. Materials And Methods

Since September 2018 to February 2019, we successfully used intracorporeal single ligation of cystic artery and duct in 40 patients with symptomatic Gall bladder stones undergoing laparoscopic cholecystectomy.

We used 4 ports; a 10 mm umbilicus port for camera, two 5-mm lateral ports and one 10 mm working epigastric port. Open technique was used to create pneumoperitoneum. Certain modifications were adopted for few cases, wherein the Gall bladder was held halfway through the body with the lateral port to create right amount of tension on the infundibulum and cystic duct. Another grasper held in left hand was used to hold the infundibulum through the 3rd port. This facilitated easy dissection of cystic duct and artery to clear the peritoneum just below the infundibulum and away from the junction to common bile duct.

We used inverted 'C' technique for SLAD with 12-15 cm No.1 polyglactin 910 free tie. The free tie was held in needle holder in such a way that about 1 cm of the end of tie was protruding from the jaw. The tie was introduced on needle holder through the epigastric port, and pushed through window created behind cystic

duct and artery complex. The protruding end of the tie was grasped with the help of a Maryland passed through the 3rd port. The long arm of inverted C loop was held by grasper and 2 over-wrap created over the tip of the needle holder. The short-free end of the suture was grasped by the needle holder and pulled in the opposite direction of the grasper to make a square knot at 0.5 to 1 cm from the junction to the common bile duct. The long arm of the suture was looped on the needle holder to create 2nd and 3rd square knots, completing the SLAD.

A long jaw grasper passed through the 3rd port was used to hold and occlude cystic duct and artery simultaneously, just below the infundibulum. Cystic duct artery complex was divided below the locked grasper at a safe distance of approximately 1 cm away from the ligature. The locked grasper is used to create appropriate tension required during dissection of the Gall bladder. A monopolar hook is used to dissect the Gall bladder from its bed. After freeing Gall bladder from the bed, it was extracted under vision through epigastric port with the help of grasper locked at infundibulum. The 10mm ports are closed with No.1 polyglactin 910 over a J shaped round body needle. The other 5mm ports and skin is closed with polyamide 2/0 over 36mm reverse cutting needle.

In the postoperative period patient was started on oral liquids after 6-8 hrs of surgery and discharged on 1st or 2nd postoperative day.

Patients were followed up in our outpatient department on 5th or 6th postoperative day. The 2nd outpatient visit was 8-10 days later for suture removal and to review histopathology report.

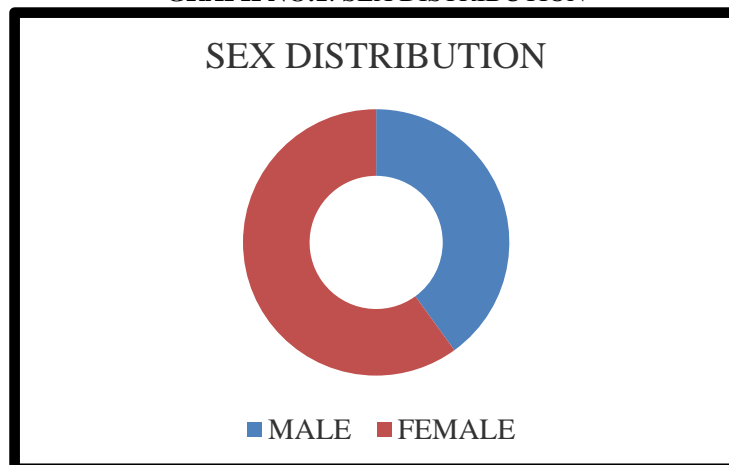
III. Results

From September 2018 to February 2019, we performed SLAD in 40 patients with symptomatic Gall bladder stones. Patients were in the age group of 17-60 yrs. Average age was 45yrs. There was a slight Female predominance with 24 out of 40 (60%). We were able to tie the cystic duct and artery in single ligature. We had no bleeding complications either before or after the division of cystic duct/artery complex. The time taken for tie varied from 2.5 to 8 minutes (average 3.5min). There were 9 (22.5%) cases of acute calculus cholecystitis. We had only one case of bile leak (2.5%). One patient (2.5%) had infection at epigastric port which healed spontaneously. We had no death.

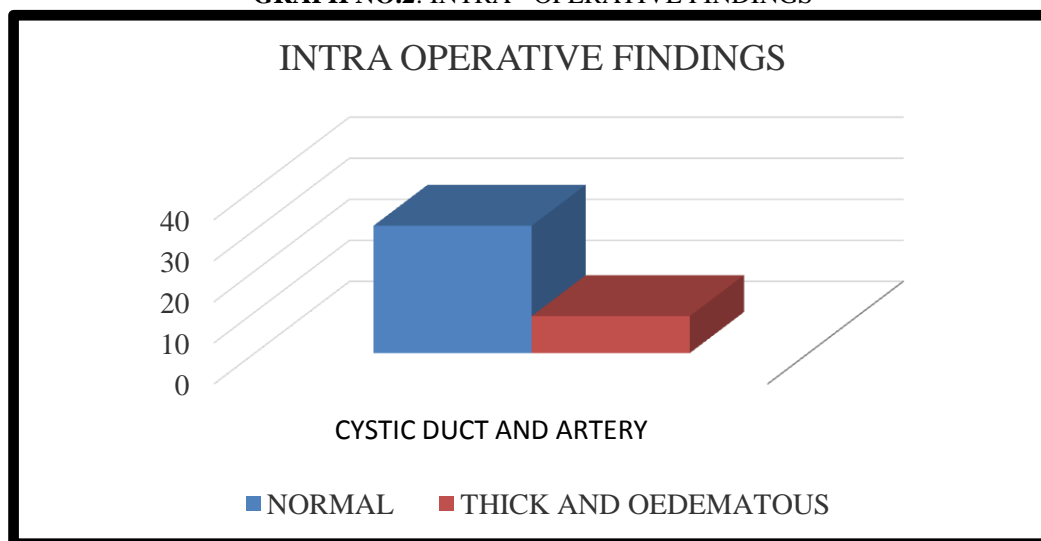
TABLE NO.1: RESULTS OF THE STUDY

VARIABLE	NUMBER (%)
Total patients	40
Male	16 (40%)
Female	24 (60%)
Mean age (Years)	45
Mean time taken for SLAD (min)	3.5

GRAPH NO.1: SEX DISTRIBUTION



GRAPH NO.2: INTRA - OPERATIVE FINDINGS



IV. Discussion

Surgical haemostatic clips have been used widely and are generally considered very safe. Although rare, studies have shown complications such as embolism of clips, internalization into the common bile duct, bile leak secondary to displacement, clip-induced biliary stone ulceration through the duodenum causing severe haemorrhage.^{1, 2, 3}

There are various techniques for securing cystic duct and arteries, including the Harmonic scalpel or 'LigaSure' in LC which has come up recently. Cost of equipment has become the main prohibitory factor. These appliances are not recommended for division of the cystic duct greater than 6 mm in diameter for safety reason. Other associated risks are injury to bowel and bile ducts.^{4, 5}

We perform good numbers of LC at our institute with an average of 100 per year. We believe that intracorporeal knot tying will be useful in advancing laparoscopic procedures. Also reduces the cost of surgery by avoiding clips without compromising efficiency and safety, as reported by other authors. Most of the reports of suture ligation uses separate and multiple ligatures for cystic duct and artery, requiring more time compared to clipping. We have successfully shown that single ligation of artery and duct is safe, secure and feasible. In a normal scenario on encountering a thick oedematous cystic artery/duct complex the procedure would get converted to Open because of difficulty or insecure clipping. However, SLAD provides the benefit of laparoscopic completion.⁶ We have used SLAD in 9 such cases successfully.

There was no bleeding complication before or after ligation and division of cystic duct/artery complex in our cases. We had 1 case with minor infection (2.5%), i.e cellulitis with serous discharge at epigastric port which healed spontaneously.⁷

Studies have shown that bile leak from cystic duct when using clips is seen in upto 3.9%. This could be due to a variety of reasons, including, inadequate closure of the duct due to mismatch of the clip arms, necrosis of the duct at the site of clipping, or slippage of the clips and migration into the biliary tract. SLAD avoids these clip related complications.⁸

There was only one case of bile leak in this series (2.5%). Studies have shown that bile leak following ligation may occur in up to 3.8%. In our case the bile leak through the drain started on the postoperative day 2. Patient had no complaints of pain abdomen, fever, nausea, vomiting which are usually seen in case of bile leak. This was managed conservatively by observing the drain output and for signs and symptoms of peritonitis. The leak gradually decreased and stopped by postoperative day10. Management options for bile leak include observation, ERCP and decompression, percutaneous drainage and open laparotomy.^{9, 10}

V. Conclusion

Single ligation of artery and duct is feasible and safe alternative method to secure cystic artery and duct in laparoscopic cholecystectomy. Intracorporeal 'single ligation of artery and duct' can be easily learned. Although it can be used routinely, it gives an added advantage over clips in cases with thick oedematous cystic artery / duct complex. There is no increase in operating time as only one ligature is used.

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