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Cystic Artery Control with Bipolar Electrocauterization During Laparoscopic Cholecystectomy

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Abstract. Laparoscopic cholecystectomy is a widely practiced procedure for symptomatic cholelithiasis. Haemostasis of cystic artery can be achieved with clips electrocautery and ultra modern vessel sealing energy devices. Bipolar electro coagulation of cystic artery is safe and a cost effective measure in developing countries. Our aim was to establish the feasibility of bipolar electrocautery in securing cystic artery. We conducted a prospective study on 120 patients in different age and sex groups. Correctable co morbidities were not a contraindication to inclusion criteria. Anatomical variations in size, origin and number of cystic artery were noted.

Key words: cholelithiasis, laparoscopy, cholecystectomy, monopolar cautery, cystic artery.

Introduction

The first laparoscopic cholecystectomy was performed by Muhe in 1986 [1]. The technique was put under strong criticism regarding the patient safety. However nowadays laparoscopic cholecystectomy (LC) is considered as the gold standard treatment of symptomatic gallstones [2]. Laparoscopic anatomy is different on visualization as compared to open surgery. Hence a thorough knowledge about biliary anatomy and its variations is essential to carry out cholecystectomy safely. Cystic artery is a branch of hepatic artery in 90% of the population and is nearly always observed in Calot's triangle [3]. Variations in origin and course of cystic artery are not uncommon. Various techniques have been described to secure the cystic artery during laparoscopic cholecystectomy of which titanium clips are most frequently used [4]. Surgical clips in laparoscopic surgery have their own complications [5]. Clips can slip, dislodge, ulcerate, migrate, internalize and give rise to other complications [6]. Clipless laparoscopic cholecystectomy with different haemostatic devices has been tried worldwide. Haemostatic devices used in laparoscopic cholecystectomy are monopolar electrocautery, bipolar electrocautery, ultrasonic coagulator and ligasure vessel sealing system. High equipment cost limits the availability and routine use of harmonic scalpel and ligasure in LC. We describe our experience with bipolar electrocoagulation to secure cystic artery in 120 patients.

Methodology

This prospective study was undertaken in postgraduate department of surgery MMIMSR Ambala from January 2016 to October 2018. Patients with symptomatic cholelithiasis were included in the study. A detailed his-

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tory, physical examination and relevant blood investigations were sent. Patients with jaundice were evaluated for choledocholithiasis. Viral markers for hepatitis B, and human immunodeficiency virus (HIV) were sent in all cases. Consent for procedure especially cystic artery hemostasis with bipolar electrocautery was obtained after thorough explanation. Only patients consenting for bipolar electrocautery were included in the study.

Procedure was carried out in standard American technique with 4 port technique. Patients were encouraged to empty bladder just before operation and routine Foleys catheterization wasn't performed. This favored early post operative ambulation. Calot's triangle was dissected ensuring critical view of safety. Cystic artery was cauterized using bipolar electric current close to gall bladder and divided. No clips were applied to the cauterized cystic artery. Oral liquids were encouraged 6–8 hours after surgery in most cases.

Results

A total of 120 patients were included in the study. Age ranged 19 to 66 years (mean 40.5 years), majority of the patients being in 3rd and 4th decade of life. Majority of the patients were females with male: female ratio of 6.5:1. Acute cholecystitis was observed in 9 patients. Concomitant choledocholithiasis was found in 12 (10%) patients. Patients with CBD stones underwent preoperative endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy and stone clearance followed by interval laparoscopic cholecystectomy 4–6 weeks later.

12 patients had hypertension, 6 had diabetes mellitus, and 5 had hypothyroidism. Patients with comorbidities were optimized for general anesthesia before surgery. Prophylactic antibiotics were administered in all cases. Patients with co-morbidities were posted first in the list. Difficult Calot's anatomy was encountered in 4 (3.2%) (3 immediate, 1 elective cholecystectomy) patients. Cystic artery was single in 92%, branched in 6% and absent in 2% cases. Normal length cystic artery was observed in 84%, long 8%, short 6% and absent in 2% cases.

1 patient (0.8%) had intraoperative cystic artery bleed due to avulsion that was immediately controlled with Liga clips. Drain in Morrison pouch was kept routinely in acute cases (9 patients). 1 patient each with difficult Calot's (elective group) and cystic artery avulsion also had drain in Morrison pouch. NG tube was also inserted in these 11 (13.7%) patients only which was removed the next morning. Drains were removed between 2nd–5th post operative days after ultrasound suggested no intra-abdominal collection.

2 patients (1.6%) with acute cholecystitis had minor bile leaks post operatively. In both patients the leaks subsided spontaneously with observation within 7 days. Post operative hospital stay ranged 1–7 days (mean 1.1 days).

Discussion

Among all the biliary diseases, cholelithiasis is most common pathology encountered. Laparoscopic cholecystectomy is nowadays one of the most frequent procedures performed worldwide and is considered the gold standard procedure for symptomatic gall stone disease [2]. Various techniques have been devised to control cystic artery during laparoscopy. These include titanium clips, monopolar electrocautery, bipolar energy devices (harmonic scalpel, ligasure), absorbable suture ligation and bipolar electrocoaguation [4] in addition to being costly, titanium clips may be complicated by slippage leading to bleeding in postoperative period [6]. Harmonic scalpel, ligasure vessel sealing devices are add significant to the cost of equipment and procedure, besides they are not readily available everywhere especially in developing countries. Ligating the cystic artery with absorbable sutures requires dexterity and expertise which is lacking in most surgeons starting their surgical career in laparoscopy. The artery may avulse if too much of traction is applied during ligation. With monopolar electrocautery, the depth of burn is less predictable and current can be conducted through

non-insulated instruments and trocars [7]. Our study aimed at analyzing the safety of bipolar electrocoagulation for securing cystic artery during laparoscopic cholecystectomy. Although the approach is faster and less expensive, many surgeons are afraid of using this method as they consider it unsafe.

We observed cystic artery anomalies in few cases. Short cystic artery was encountered in 6% patients. After skeletonizing the cystic artery there must be sufficient length available to coagulate the vessel. We did not encounter difficulty in coagulating the short cystic artery in any case. M. Falih et al. [8] suggested electrocoagulation of short cystic artery where sufficient length was not available for clip application.

None of the patients in our study required re-exploration due to postoperative hemorrhage from electrocoagulated cystic artery. Incidence of reoperation for post operative cystic artery bleed is 1.5% with clip application versus 2% with electrocoagulation in most studies [9].

There was no bowel injury, no major bile duct injury and no mortality in our case. Only 2 patients (1.6%) suffered minor duct bile leakage postoperatively which resolved within a week spontaneously.

Conclusion

Cystic artery hemostasis with bipolar electrocoagulation during laparoscopic cholecystectomy is safe, cost effective and quick to perform with relatively less complications. It is a boon for novice surgeons introduced new to laparoscopy. Its usefulness when cystic artery is of short length makes it preferable to clips and intracorporeal knotting.

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