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CONTROL OF CYSTIC ARTERY DURING LAPAROSCOPIC CHOLECYSTECTOMY, CLIPPING VERSUS BIPOLAR ELECTROCAUTRY: INSTITUTION BASED EXPERIENCE

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ABSTRACT

Background: This study was undertaken to determine the efficacy of use of bipolar electrocautry in dealing with cystic artery during laparoscopic cholecystectomy, and to establish weather bipolar electrocautry is an equivalent alternative to conventional clip application. **Methods:** About 200 patients undergoing laparoscopic cholecystectomy were selected on a prospective basis and divided into two groups- A and B(100 patients in each group. a comparative study was done between the two group. Clips were used to control cystic artery in group A patients and bipolar electrocautry was used for the same in group B. **Results:** In group A, 3 patients had clip slippage intraoperatively which was dealt by reapplication of clips.in group B,2 patient had intraoperative bleeding from cystic artery few minutes after application of bipolar thermal energy which was dealt by applying clips. In both the groups no postoperative bleeding was encountered. **Conclusions:** During laparoscopic cholecystectomy, clip usage and bipolar electrocautry are equally competent in achieving haemostasis of cystic artery.

KEYWORDS: Clips, Cystic artery, Laparoscopic cholecystectomy, elctrocautry.

INTRODUCTION

Over the past two decades, laparoscopic cholecystectomy (LC) has become the gold standard for the surgical treatment of gallbladder disease. A shorter hospital stays (and, thus, a more rapid return to normal activity and work), less postoperative pain, a faster recovery, better cosmesis, and good cost containment are some of the advantages of LC over open surgery.[1,2] During laparoscopic cholecystectomy, One of the major step in dissection of calots triangle is to identify cystic artery, which is cauterized or clipped subsequently.[3] Improper control of cystic artery leads to uncontrollable bleed which obscures the operative field and thus surgeon is forced to convert the laparoscopic procedure into open cholecystectomy bringing lot of morbidity to the patient. Hepato-biliary area is known for its congenital anomalies. Cystic artery which normally should arise from right hepatic artery, sometimes abnormally arises from common hepatic artery, left hepatic artery, gastroduodenal artery, coeliac plexus etc. so proper identification of cystic artery and its good control is a vital step for successful outcome. Several methods are followed for control of cystic artery like application of titanium clips, monopolar cautery, bipolar cautery, vessel sealers, ultrasonic devices etc.[4,5] Among these clip application is a popular one in laparoscopic cholecystectomy. Titanium clips are used, which when applied by a clip applicator, compresses and hold the applied structure-duct, vessel etc. They are nonabsorbable, effective and affordable.[6] Though the clips are made of metals, they don't have any ferromagnetic properties thus enabling the patient fit for any scans like MRI, if necessary, to be done in future. The other one, electro-thermal cauterization is also commonly used. Here tissues are burnt and shrivelled by means of electric current generating heat at the tip. Two types of them are in practice- monopolar and bipolar diathermy. Though these effectively cauterize the tissues the main problem is of lateral dissipation of heat leading to injury of adjacent structures like common bile duct, hepatic artery, portal vein etc, which is more common with monopolar diathermy.[7,8]

Of late ultrasonic energy devices are becoming more popular.in an ultrasonic device the tip of the instrument

vibrates with a high frequency (more than 20000 hertz, hence called ultrasonic, here 20000 hertz is the upper limit of human audible range), when activated, thus sheering and shrivelling the tissues.But these ultrasonic energy devices are expensive and not always available everywhere. Hence, we decided to do a comparative study between clip application and bipolar electrocautry usage with the intention of identifying a safe and accurate method for cystic artery control during laparoscopic cholecystectomy.[9-11]

METHODS

The present prospective study was conducted in the Postgraduate Department of General Surgery, Government Medical College, Srinagar. The study was conducted between May 2015 to march 2018. A total of 200 patients planned for elective laparoscopic cholecystectomy were enrolled. Informed consent was taken from all patients. Approval was taken from hospital ethics committee. All patients presenting with symptomatic gall stone disease were included in this study. After clinical examination, liver function test and ultrasound scan of abdomen was done for every patient to confirm presence of gallstones. Patients were randomly distributed between two groups- group A and group B, with 100 patients in each group. Surgeon with an experience of 12 years in laparoscopic surgery and who regularly do cholecystectomy were selected. The selected surgeons were well versed with usage of electrocautry and clip application.

In group A patient's cystic artery control was achieved by means of clip application.in group B patients the same was achieved by means of bipolar electric cauterization.Any event of inappropriate control of cystic artery was documented soon after the procedure and amount of blood loss was also measured and noted. A blood loss of more than 100ml was considered significant. Also, any event of inadvertent injury to surrounding structures was documented. Patients were followed for 2 days after the procedure, their vital data (pulse rate, blood-pressure, urine output) checked every four hourly and any event of postoperative haemorrhage (more than 100ml) documented by observing the drains and ultrasound scan reports. With all the available details a comparative study was done between the two groups.

Statistical analysis

All the statistical analysis was performed as per protocol. Statistical data was computed and analysed with SPSS latest version (SPSS inc., Chicago, Illinois, USA) and they were quantized as Mean±Standard deviation. P value less than 0.05 was considered significant statistically. Intraoperative bleed and injury to surrounding structures during cystic artery control, operative time, difficulty in performing the procedure requiring placement of additional ports, conversion to open cholecystectomy and postoperative vomiting, fever, significant blood loss were the considered factors.

RESULTS

In group A-clip application, among 100 patients 21% were males and 79% were females.in group B-bipolar cauterization 18% were males and 82% were female patients. It was female patients who commonly got affected in our study in the ratio of almost 1:4 in both the groups respectively. In group A the median age of male and female patients was 38.8yrs and 36.6yrs respectively.in group B it was 40.2 and 37.1 years respectively. Cystic artery was abnormal in 2% and 4% of cases of group A and B respectively.

Image-1: Photograph depicting use of bipolar cautry.

Cystic artery normally arises from right hepatic artery.in our study any abnormal origin of cystic artery from common hepatic artery, left hepatic artery, coeliac plexus etc. was considered anomalous. Intraoperatively cystic artery bleed was encountered in 3 cases of group A due to loosening of clips which was later dealt with reapplication of clips successfully. In group B 2 patient had cystic artery bleed intraoperatively even after application of thermal energy which was successfully controlled by clip application.Surgery related factors like operative time, conversion to open cholecystectomy were studied to assess any difficulty in surgery in both the groups.

Table 1: Clinical data and outcomes between clip application versus bipolar cautry usage.

Parameters	Group A	Group B
Total no. of cases	100	100
Male/female (M/F)	21/79	18/82
Median age in years (M/F)	38.8/36.3	40.2/37.1
Cystic artery anatomy Normal Anamolous	 98% 2%	 96% 4%
Cystic artery bleed	3%	2%
Conversion to open	3%	2%
Mean intraoperative time (in minutes)	28.4±3.5	27.6±4.5
Postoperative bleed	0	0

The mean operative time stood between 28 to 32 minutes. In only few cases there was need for conversion to open cholecystectomy. Conversion to open cholecystectomy was done in 3 case of group A, and in 2 case of group B. in the postoperative period factors like

nausea, vomiting, fever and postoperative bleed were studied. More than 100ml of fresh blood in drain or a collection of similar quantity in ultrasound scan was considered as significant bleed but postoperatively no significant bleed was encountered in both the groups. The results are tabulated (table 1).

DISCUSSION

With increase in minimally invasive procedures, as more and more surgeons are getting trained, laparoscopic cholecystectomy has become the commonest hepatobiliary surgery performed.[12] During the said procedure control of cystic artery is a vital step which is being done by varied types of methods like clip application, monopolar and bipolar cautery, vessel sealers and ultrasonic devices.[13]

So we conducted a prospective comparative study between two groups of patients undergoing laparoscopic cholecystectomy by usage of clips in one group and usage of bipolar electrocautry in other group for control of cystic artery. Female preponderance was noticed in both the groups in the ratio of 1:4 matching the demographic data presented by Hugh TB, Kelly MD, Li B et al in their study of laparoscopic anatomy of the cystic artery.[14] The median age of presentation in both group was touching forty years of age. In both groups females presented at early age than males. Age demographics were on par with those described in Khan S, Oonwala ZG et al.[15] Abnormal origin of cystic artery was noticed in about 2% and 4% of cases of both groups slightly lower than the figures published by Suzuki M, Akaishi S, Rikiyama T. et al in their study of Laparoscopic variations in cystic arterial supply.[16] There was not much difference in effectiveness of clip usage and bipolar cautry device usage in control of intraoperative bleed.[17] Both showed promising results and there was no postoperative bleed in both method usage. These results concurred with study done by Huscher CG, Lirici MM, Di Paola M, Crafa F, Napolitano C, Mereu A, et al in their study of Laparoscopic cholecystectomy by ultrasonic dissection.[18] Our results showed that there was no significant difference statistically between clip and bipolar thermal energy application for cystic artery control.

CONCLUSION

Clip application and bipolar electrocautry application are equally safe and efficacious methods in the hemostatic control of cystic artery during laparoscopic cholecystectomy.

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Conflict of interest: None declared.

Ethical approval: The study was approved by the Institutional Ethics Committee.

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