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Three midline port for laparoscopic cholecystectomy- An alternative to standard port placement increasing critical view of safety. A Prospective Cohort Study.

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ABSTRACT

Introduction- There has been a lot of changes in the technique and technology of doing laparoscopic cholecystectomy since1985. Most of the changes took place to increase the critical view of safety (CVS). Our approach is to increases the critical view of safety leaving very remote possibility of injuries to arterial and biliary system.
Method- Total (80) patients undergoing elective cholecystectomy for symptomatic gallstones were included. Three Midline port of size 10mm. 5mm and 10mm were placed at peri umbilical area, 3 inch cranial to 1st one and in the Epigastric area respectively. The last two are working port and inter changeable. **Results-** The results were compared with literature in terms of injuries to the biliary and arterial system. There were no injuries to biliary and arterial system in our study **Conclusion-** The three-midline-ports approach is a safe and easy technique with enhanced critical view of safety.

KEYWORDS : - Midline port, Laparoscopic Cholecystectomy (LC) and critical view of safety (CVS)

Introduction- Laparoscopic cholecystectomy (LC) is the most common surgical procedures done in India and probably the world. It has become the gold standard procedure for the management of symptomatic gall stone disease. The most common causes of morbidity after LC is bile duct injury, which implies not only complex procedures of repair like surgery, radiology and endoscopy but also a serious impact on patients outcomes[1,2] as well as litigations particularly in subject with acute cholecystitis, where the triangle of calot present some difficulties in defining the biliary and vascular structures.

The term "Critical View of Safety" was introduced in an analytical review written in response to the sudden increase in biliary injury associated with laparoscopic cholecystectomy.[3]. CVS is a method of secure identification in which the cystic duct and artery are identified, after which the gallbladder is taken off the cystic plate so that the gallbladder is attached only by the 2 cystic structures.[4]

After the introduction of CVS in1995, operative notes were studied in an attempt to determine if CVS was used in procedures in which biliary injury had occurred.[5] It was found that the method of target identification by infundibular technique in which the cystic duct is identified by exposing the funnel shape where the infundibulum of the gallbladder joins the cystic duct leading to visual deception which may result that the common bile duct is the cystic duct.[5] The principle of CVS is less susceptible to this sorts of deception because better exposure of each structures is needed to achieve CVS.

Our study of three midline port placement is to expose the posterior and anterior surface of the triangle of Calot so nicely and clearly that contents of the triangle get identified individually thus increases the critical view of safety and avoid any injuries to arterial and biliary system.

Material and Methods- A prospective cohort study was performed at PGIMER Dr RML Hospital New Delhi between March 2016 and January 2017. Total 80 patients undergoing elective cholecystectomy for symptomatic gallstones were included. The patients were properly investigated and Pre-anaesthetic clearance were taken. All patients were operated under General anesthesia and in supine position Port Placement- The Operating surgeon stand on the left side of the patient with the camera man by his side. Pneumoperitoneum is created with closed technique using Veress Needle by giving a 1cm small subumbilical/ periumbilical incision. A 10mm port is inserted through the same incision(optical port). Two other operating ports are used in the epigastrium 10mm and one 5-mm between the two port 3 inch cranial to the optical one in the linea alba. The Forth port of 5mm is inserted only when fundus is quite large and redundant. (Figure 1)

Figure1 Showing Port placement in Midline

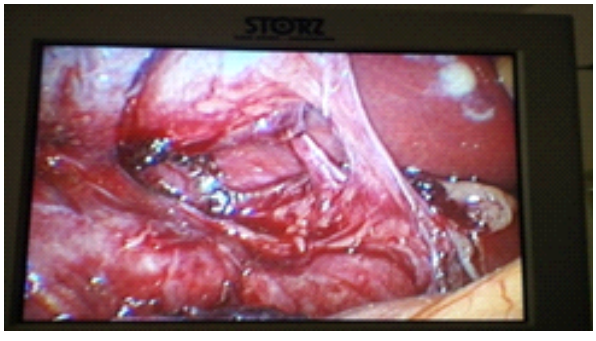

Figure 2- Complete exposure of Posterior Surface.

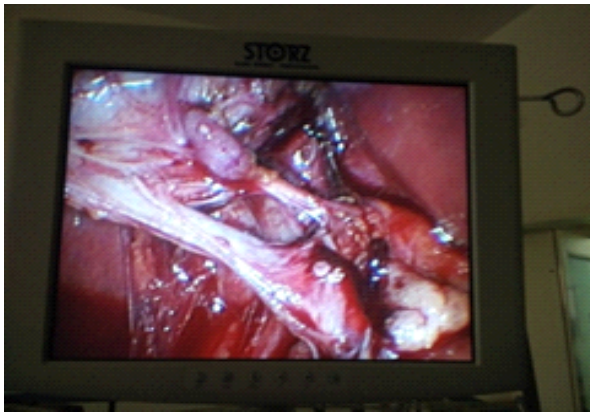

Figure 3- Complete Exposure of Anterior Surface of Triangle of Calot

The Hartmann pouch /Neck is grasped and flipped cephald with a grasper introduced in the midline 5-mm port, to achieve a complete exposure of the posterior surface of the triangle of Calot. This facilitate the posterior dissection of Triangle of calot. (Figure 2) The dissection of the cystic pedicle and anterior surface of triangle of calot starts by retracting the Hartman pouch/ neck downwards and laterally to achieve a complete exposure of the anterior surface of the triangle of Calot and cystic pedicle. (Figure 3).

The dissection is done with the dissector (Maryland) . The electrocautery is used judiciously to avoid injury to biliary system. The Cystic duct and artery are cleared of all the adhesions and identified clearly and individually to achieve the critical view of safety. The dissection on the peritoneal reflection of the gallbladder starts medially to expose the cholecystohepatic plate so that all the 3 elements of the CVS are clearly demonstrated. Then the cystic artery and cystic duct are clipped using 200/300 titanium clip two proximally and one distally and then divided by scissors. The separation of the gallbladder from the gallbladder fossa of liver is achieved by getting the correct plane with an electrosurgical hook knife thus avoid bleeding.

Finally, the gallbladder is extracted through the Epigastric port. After Extraction of the Gall bladder, a through irrigation of the epigastric post, gall bladder fossa and liver surface is given by normal saline. Finally the stumps of the cystic artery and duct and the gallbladder bed are inspected for any leak/bleed before the start of the closure. All port wounds are infiltrated with local anaesthetics before the closure to control the post-operative pain.

Results- Eighty (80) patients were included in our study group. The age ranges from 25-62yr. 66 were female and 14 were male. The BMI of the patients were between 22-33. Two male and four female were diabetics and three male and two female were Hypertensive. One male were having both diabetic and hypertensive.

There were no injury to the biliary system as well as any major arterial system to any of the patients. Two patients had minor arterial bleed probably because of injuries to the posterior branch of cystic artery during dissection. Both were controlled by simply pressing for two minutes by the gallbladder neck/infundibulum. During the study, two patients were converted to open cholecystectomy because there were dense adhesions and the triangle of calot were freezed. These two patients were not taken into the study. There were no morbidity and mortality in our study group.

Discussion- The first laparoscopic cholecystectomy (LC) was done in 1985, since then there have been many changes in number and position of port placement, but all authors agree that LC as an accepted gold standard treatment for Symptomatic Gall stone disease. The four port LC is the standard procedure in French/Americal method.

The advances in the Laparoscopic surgery are mainly focused for aesthetic reasons which range from single-incision laparoscopic surgery (SILS) to natural orifice transluminal endoscopic surgery (NOTES),[6] with the transvaginal approach being the most widely accepted to date. The main concern with SILS are special devices and its specific surgical instruments with long learning curve which is uncomfortable for many surgeons because of the proximity of the ports. [7,8]

The term "Critical View of Safety" was introduced in an analytical review written in response to the sudden increase in biliary injury associated with LC.[3] The Use the Critical View of Safety (CVS) method of identification of the cystic duct and cystic artery during LC.[4] requires three criteria. These are hepatocystic triangle is cleared of fat and fibrous tissue, the lower one third of the gallbladder is separated from the liver to expose the cystic plate and Two and only two structures should be seen entering the gallbladder.

The three midline-ports approach for LC is as comfortable as the conventional techniques for LC and allows the use of normal laparoscopic instruments.[9] Both the French and American trocar positions during LC take advantage of the "triangulation effect," a concept that is common to any other laparoscopic operation and is important in every case and particularly so in more difficult cases.[10] but it is not always the truth. The "triangulation effect" with the scope located between the two working instruments is not used in frequently performed laparoscopic approaches, such as colectomies or appendectomies or total extra peritoneal hernioplasty , and the exposure and the dissection are safely performed.

In our study there was a little problem with the Triangulation effect initially probablybecause of being accustomed the americal method of LC but over the time and with experience this problem were over. Rather I feel more comfortable because of the relatively comfortable position of the left hand. In the result we get an excellent exposure and dissection of the triangle of Calot thus enhancing the CVS . It eliminates almost all possibility of injuries to the biliary as well as arterial system including any anomalous arterial and biliary development.

Bile duct injury rates have increased since the introduction of LC, occurring in about 3 per 1,000 procedures performed.[11]. Bile duct injuries after cholecystectomy can be life altering complications leading to significant morbidity and cost.[12,13] Artery that crosses anterior to the common bile duct.[14] are common variants of aberrant anatomy including a short cystic duct, aberrant hepatic ducts, or a right hepatic In our study, there were no injury to the biliary system. As the no. of patients are only 80 vis a vis bile duct injuries are relatively infrequent, Larger and controlled study is further needed to substantiate these finding.

Conclusion- The three-midline-ports approach is a safe and easy technique to implement. It enhances the Critical View of Safety and eliminates almost all possibility of injuries to the biliary as well as arterial system including anomalous development of biliary and arterial development. More studies comparing this approach with the standard methods is needed to validate the benefits of this approach.

References

[1] Zha Y, Chen XR, Luo D, Jin Y. The prevention of major bile duct injures in laparoscopic cholecystectomy: the Diagnostic and experience with 13,000 patients in a single center. Surg Laparosc Endosc Percutan Tech. 2010;20:378–383. PMID : 21150413. [PubMed]

[2] Neri V, Lapolla F, Forlano I, Di Lascia A, Fersini A, Tartaglia N. Cholecystectomy morbidity in the laparoscopic era. Wyno Journal of Medical Sciences. 2013;2(2Ł):9–25.

[3] Strasberg SM, Hertl M, Soper NJ. An analysis of the problem of biliary injury during laparoscopic cholecystectomy. J Am Coll Surg. 1995;180:101–125.

[4] Strasberg SM, Brunt LM. Rationale and use of the critical view of safety in laparoscopic cholecystectomy. J Am Coll Surg. 2010;211:132–138.

[5] Strasberg SM, Eagon CJ, Drebin JA. The "hidden cystic duct" syndrome and the infundibular technique of laparoscopic cholecystectomy: the danger of the false infundibulum. J Am Coll Surg. 2000;191:661–667.

[6] Freeman LJ, Rahmani EY, Al-Haddad M, Sherman S, Chiorean MV, Selzer DJ, Snyder PW, Constable PD. Comparison of pain and postoperative stress in dogs undergoing natural orifice transluminal endoscopic surgery, laparoscopic and open oophorectomy. Gastrointest Endosc 2010;72:373–380.

[7] Marks J, Tacchino R, Roberts K, Onders R, Denoto G, Paraskeva P, Rivas H, Soper N, Rosemurgy A, Shah S. Prospective randomized controlled trial of traditional laparoscopic cholecystectomy versus single-incision laparoscopic cholecystectomy: Report of preliminary data. Am J Surg 2011;201:369–372.

[8] Ahmed K, Wang TT, Patel VM, Nagpal K, Clark J, Ali M, Deeba S, Ashrafian H, Darzi A, Athanasiou T, Paraskeva P. The role of single-incision laparoscopic surgery in abdominal and pelvic surgery: A systematic review. Surg Endosc 2011;25:378–396.

[9] Jaime Ruiz-Tovar, MD, PhD,1 Irene Ortega, MD,2 Jair Santos, MD,1 Carolina Llavero,3 Liliana Sosa, MD,4 Laura Arman˜anzas, MD,1 Salvador Garcı´a, MD,2 and Rafael Calpena, MD, PhD1 Three Ports Placed in the Linea Alba of the Abdomen (Three-Midline-Ports Technique) An Alternative Approach for Laparoscopic Cholecystectomy. JOURNAL OF LAPAROENDOSCOPIC & ADVANCED SURGICAL TECHNIQUESVolume 23, Number 1, 2013: 52-55

[10] Cuschieri A. Laparoscopic cholecystectomy. J R Coll Surg Edinb 1999;44:187–192.

[11] Buddingh KT, Weersma RK, Savenije RA, van Dam GM, Nieuwenhuijs VB. Lower rate of major bile duct injury and increased intraoperative management of common bile duct stones after implementation of routine intraoperative cholangiography. Journal of the American College of Surgeons 2011; 213:267-74.

[12] Kern KA. Malpractice litigation involving laparoscopic cholecystectomy. Cost, cause, and consequences. Archives of Surgery 1997; 132:392-7; discussion 7-8.

[13] Flum DR, Flowers C, Veenstra DL. A cost-effectiveness analysis of intraoperative cholangiography in the prevention of bile duct injury during laparoscopic cholecystectomy. Journal of the American College of Surgeons 2003; 196:385-93.
[14] Strasberg SM. A teaching program for the "culture of safety in cholecystectomy" and avoidance of bile duct injury. Journal of the American College of Surgeons 2013; 217:751.