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Original Research Article

Critical View of Safety is a Safe Approach for Laparoscopic Cholecystectomy

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Abstract

Background: Laparoscopic cholecystectomy has morbidity due to bile duct injuries about 0.3% to 0.5% [1]. The main technique used for gallbladder dissection is infundibulum technique. Critical view of safety method is identification of the cystic duct and cystic artery during laparoscopic cholecystectomy and it is used to minimize risk of bile duct injury. Several studies confirm the routine use of critical view of safety technique eliminate the chance of bile duct injury. First introduced by Steven Strasberg 1992 [1]. ***Materials and Methods:*** A retrospective study compared the critical view of safety with infundibular technique regarding operative time, and bile duct injuries. We had 487 patients with critical view of safety and 534 with infundibular technique done at Misurata cancer center between January 2012 and December 2015. Indication of surgery were acute cholecystitis and biliary colic. All operations done by both young and experienced surgeons. ***Results:*** There were 1021 laparoscopic cholecystectomy, 483 with critical view of safety technique, 538 patients with infundibular technique. The mean operative time in critical view of safety is 57 minutes while in infundibulum technique is 43 minute. Risk of cystic duct stump leak in critical view of safety is 0.4%, while in infundibulum technique is 0.6%. The risk of major bile duct injuries in critical view of safety in our study is 0%, while in infundibulum technique is 0.4%. ***Conclusion:*** The risk of bile duct injuries is the main concern in laparoscopic cholecystectomy. Critical view of safety technique in compared to infundibulum technique has a little increase in the operative time and less bile duct injuries.

Keywords: Critical view of safety, infundibulum technique, laparoscopic cholecystectomy.

INTRODUCTION

Since the first laparoscopic cholecystectomy (LC) done by Dr. Muhe in 1986 [3], the procedure became one of the most commonly performed operations worldwide [3]. Because of the relative ease learning curve of LC along with significant improvement in recovery of the patients compared to open cholecystectomy, LC became the surgical standard in early nineties.

The National Institute of Health elected laparoscopic cholecystectomy as a gold standard operation for gallbladder disease in 1992. Strasberg *et al*., [1] in the early nineties explained how a critical view of safety (CVS) should be done every time by dissecting the whole infundibulum off the liver bed and remove all fatty tissue around from both anterior and posterior part. This was his opinion [1]. This would prevent accidental biliary and vascular injuries due to anatomical variations. Bile duct injuries in LC significantly increased in comparison to OC. The incidence of bile duct injuries in OC era was at 0.1 to 0.2% [5, 6], while the risk of bile duct injuries in LC was at 0.3 to 0.5 % [3, 7-9]. But LC gained wide acceptance as a result of many advantages of a smaller incisions with better cosmetic results, less postoperative pain, shorter hospital stay, and faster return to daily living as compared to OC. Minimal invasive surgery have been developed, this include Single Incision Laparoscopic Cholecystectomy (SILC) was first described in 1995, and Natural Orifice Transluminal Endoscopic Surgery (NOTES) but neither SILS or NOTES became a standard of care.

AIM AND OBJECTIVES

Comparison of bile duct injuries in critical view of safety technique and classical infundibulum technique for laparoscopic cholecystectomy.

METHODS

A retrospective study of a period of practice in between January 2014 to April 2016 in our surgical

department at National Cancer Institute Misurata, were 1021 cases of LC done, 483 of cases of CVS and 534 of classical infundibulum(IF) technique. We comparing the result of both techniques regarding age, sex, indications of surgery, operative time, intra and postoperative bleeding, biliary injuries and how it managed.

In CVS technique, a standard of 4 trocars inserted, CO2 insufflation done with veress needle technique, 10mm camera port at supraumbilical area, 10mm port at epigastric area for dissector, cautery work and clip applier, 5mm port at midclavicular line for infundibulum grasping, and 5mm trocar at anterior axillary line for grasping the fundus of the gallbladder. This trocar is standard used for both technique. CVS technique started by grasping of the fundus cephalad and lateral traction of the infundibulum. Incision of the serosa just below the infundibulum at its ventral part by the cautery hook, this incision is extended with carful dissection inform of hook look and cock, identification of cystic artery and cystic duct with clear window in between until the liver bed is visible from ventral part. Then serosa behind the cystic duct opened with cautery hook and meticulous dissection at this part until the liver bed appear to be clear from ventral part then all fatty tissue between gallbladder, cystic duct and cystic artery are cleaned, all this dissection done above the level of Ruviers sulcus as described by Strasberg *et al*., [1]. This technique followed by clipping of the cystic duct and cystic artery clearly. Then complete gallbladder dissection from its liver bed.

Infundibulum technique, after grasping the fundus of GB and traction of infundibulum laterally, opening a window with dissector just in the fat below the infundibulum and identifying two structure passing to the infundibulum of the GB then clipping of the both structure done without cleaning of all fatty tissue or identification of liver bed from ventral part. Then GB dissected from its liver bed.

RESULTS

Of 1021 case of LC no mortality occurred in the series. Sex distribution reveal 858 cases 84.04% were females, while 163 cases 15.96% were males. Age of the patients reveal 664 patients 65.03% below 50 years of age, while 357 patients 34.97% above 50 years of age. The minimum age was 9 years, while maximum age was 89 years. Acute cholecystitis were found in 161 cases 15.8%, while biliary colic for 860 cases 84.2% CVS technique for 483 cases, and IF technique for 538 cases. Indication of surgery in CVS technique were 408 cases 84.5% were recurrent attack of biliary colic while 75 cases 15.5% were acute cholecystitis. Indication of surgery in IF technique were 452 cases 84% were recurrent attack of biliary colic while 86 cases 16% were acute cholecystitis. In CVS technique 477 cases 98.8% with no complications, 1 case 0.2% received postoperative blood transfusion (BT), 3 cases 0.6% converted to open cholecystectomy, and 2 cases 0.4% complicated by cystic duct stump leak (CDSL), with no recorded case of major bile duct injury (MBDI), P value = 0.032. In IF technique 526 cases 97.8% with no complications, 2 cases 0.4% received postoperative blood transfusion (BT), 5 cases 0.9% converted to open cholecystectomy, 3 cases 0.6% complicated by cystic duct stump leak(CDSL), and 2 cases 0.4% complicated with major bile duct injury (MBDI), P value = 0.032. The mean operative time for CVS technique was 57 minutes, minimum operative time was 45 minutes and maximum was 180 minutes. The mean operative time for IF technique was 43 minutes, minimum operative time was 30 minutes and maximum was 130 minutes.

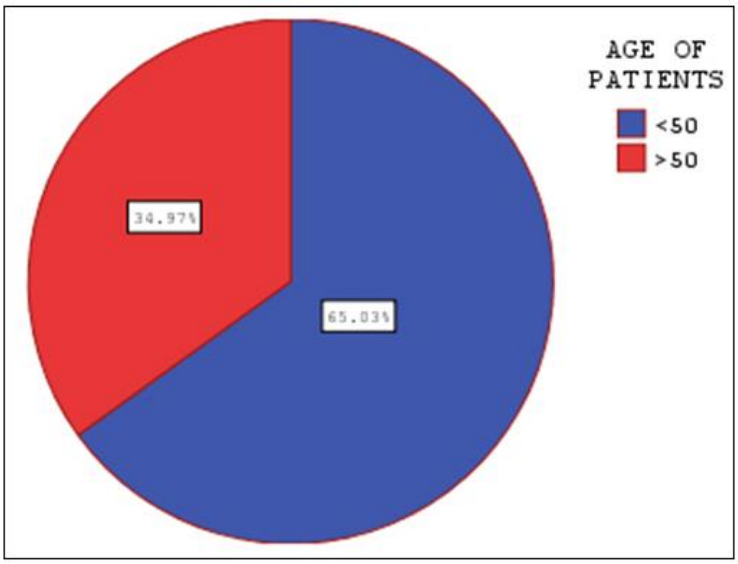

Fig-1:

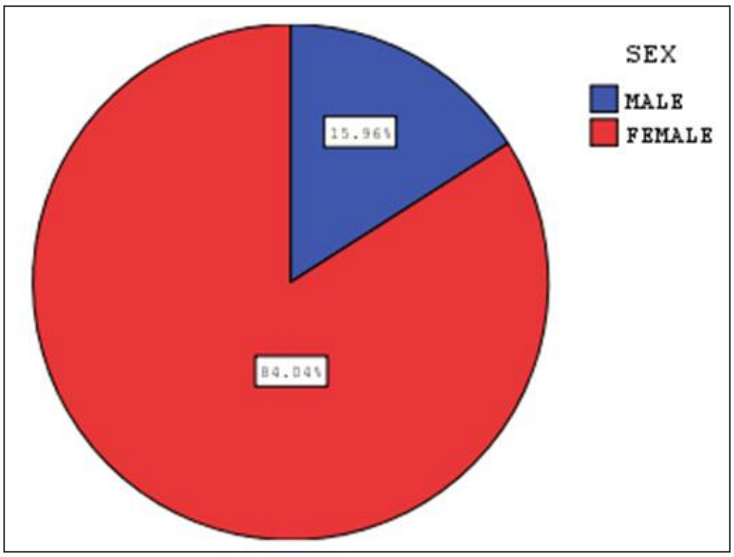

Fig-2:

Table-1: Operative technique vs Complications of surgery

		Operative technique			
		CVS		IF	
Complications of surgery	NO	477	98.8%	526	97.8%
	CDSL	2	.4%	3	.6%
	MBDI	0	.0%	2	.4%
	BT	1	.2%	2	.4%
	OPEN	3	.6%	5	.9%

Table-2: Operative technique vs Operative time per minute

	Operative technique					
	CVS			IF		
	Mean	Median	Mode	Mean	Median	Mode
Operative time per minute	57	50	50	43	40	30

Table-3: Operative time vs Indications of surgery

		Operative technique			
		CVS		IF	
Indications of surgery	BC	408	84.5%	452	84.0%
	AC	75	15.5%	86	16.0%

Table-4: Indications of surgery vs Complications of surgery

		Indications of surgery			
		BC		AC	
Complications of surgery	NO	859	99.9%	144	89.4%
	CDSL	1	.1%	4	2.5%
	MBDI	0	.0%	2	1.2%
	BT	0	.0%	3	1.9%
	OPEN	0	.0%	8	5.0%

DISCUSSION

Prevention of iatrogenic biliary tract injuries is a major concern in LC. Strasberg identified an error trap to avoid, regarding the IF technique, in which the common hepatic duct may be mistaken for the wall of the gallbladder in severe inflammation [18]. Katkhouda *et al*., [19] suggest the extention of the cystic duct dissection up to the confluence with common hepatic duct, this will form what he calls a "visual cholangiogram". Even with intraoperative cholangiogram (IOC) not seem to prevent bile duct injuries, even if it help the immediate identification of the injury [1, 12-14]. IOC ineffectiveness at lowering the rate of biliary injuries has been confirmed in multicenter trials [11, 12]. The main work to standardize approach to the cystic duct and cystic artery that must be effectively avoid the area where arterial

and ductal anomalies are likely to be encountered brought Strasberg *et al.*, [4, 18] to perform CVS since 1995, their opinion has been little mentioned, until the papers and retrospective studies started analyzing the results of the technique [2, 10, 18].

In our study we had in CVS technique 477 cases 98.8% with no complications, 1 case 0.2% received postoperative blood transfusion, 3 cases 0.6% converted to open cholecystectomy, and 2 cases 0.4% complicated by cystic duct stump leak with no recorded case of major bile duct injury, while it is 0.3-0.5% in literatures [3-6]. In IF technique 526 cases 97.8% with no complications, 2 cases 0.4% received postoperative blood transfusion, 5 cases 0.9% converted to open cholecystectomy, 3 cases 0.6% complicated by cystic duct stump leak, and 2 cases 0.4% complicated with major bile duct injury, while it is 0.4% in literatures [7-10]. The mean operative time for CVS technique was 57 minutes, minimum operative time was 45 minutes and maximum was 180 minutes, while it is 52-59 minutes in literatures [15, 16, 17]. The mean operative time for IF technique was 43 minutes, minimum operative time was 30 minutes and maximum was 130 minutes.

The first case of CDSL in CVS managed conservatively with keeping drain for about 15 days and patient discharged well. The other case of CDSL was managed with ERCP where stent is inserted and sphincterotomy done and patient discharged well. 2 cases of IF with MBDI both of them diagnosed post operatively with bile leak and jaundice were MRCP and ERCP confirm the diagnosis. The first case with complete cut of Common bile duct after IF LC for acute cholecystitis were managed with hepaticojejunostomy 6 weeks after LC due to patient diagnosed with injury 72 hours after LC and patient discharged in good condition. The other case of MBDI was at Common hepatic duct after IF LC for acute cholecystitis and early hepaticojejunostomy done 48 hours after LC and patient discharged in good condition. The two cases of IF complicated by cystic duct stump leak were managed with ERCP, stenting and sphincterotomy and both discharged well. The case of CVS recieved blood transfusion post operatively with no need for surgical intervention. Two cases of IF technique were blood transfusion recieved and also no need for surgical intervention. The most of the intraoperative bleeding in both techniques were controlled intraoperatively either with electrocautery or by compression with 4x4 small gauze or clips.

CONCLUSION

Risk of bile duct injuries is the main major problem in laparoscopic cholecystectomy. The critical view of safety technique in compared to infundibulum technique has a little increase in the operative time and less bile duct injuries.

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