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### RESEARCH ARTICLE

#### VALUE OF CRITICAL VIEW OF SAFETY TECHNIQUE IN LAPAROSCOPIC CHOLECYSTECTOMY.

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##### Key words:-

Laparoscopic cholecystectomy, critical view of safety, Complications.

#### Abstract

**Background and purpose:** The introduction of laparoscopic cholecystectomy in 1989 marked the beginning of the laparoscopic revolution. Despite of the rapid learning curve, the complication rates of bile duct injuries after laparoscopic cholecystectomy count from 0.4% to 0.5% compared to 0.2% after open cholecystectomy. Strasberg et al., introduced an important method to reduce BDIs in 1995, who described how a critical view of safety (CVS).

**Materials and Methods:** This study was carried on 30 patients with chronic calcular cholecystitis in the department of General Surgery, Zagazig University Hospitals during the period from September 2015 to September 2016. The patients divided into two groups : Group (A): was managed by critical view of safety technique .Group (B): was managed by conventional infundibular technique.

**Results:** The age of the studied patients in group (A) ranging from 25-56 years old with mean  $37.8 \pm 9.9$  and most of the studied patients are females(73.3%) and in group (B) ranging from 23-51 years old with mean  $39.5 \pm 8.2$  and most of the studied patients are females(73.3%). infundibular technique has significantly longer Operative time. no significant association between bleeding and groups. no significant association as all cases with no intraoperative bile injury. there is significant association as regard drain insertion between CVS and infundibular groups . no significant difference in hospital stay as all cases discharged on the 1st postopravte day.

**Conclusions:** The critical view of safety has an important role in decreasing the operative time because of the safe accurate identification of the anatomy that allow the surgeon to proceed without fear of misidentification .

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#### Introduction:-

The introduction of laparoscopic cholecystectomy in 1989 marked the beginning of the laparoscopic revolution. (Berci et al., 2014). The majority of surgeons have routinely performed the infundibular technique for gallbladder hilardissection since the introduction of laparoscopy. . (Vettoretto et al., 2011). Despite of the rapid learning curve, the complication rates of bile duct injuries after laparoscopic cholecystectomy count from 0.4% to 0.5% compared to 0.2% after open cholecystectomy. (Dziodzio et al., 2014). Strasberg et al., introduced an important method to reduce BDIs in 1995, who described how a critical view of safety (CVS) be achieved in each laparoscopic

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cholecystectomy. (Nijssen et al., 2014). The CVS has 3 requirements. First, the triangle of Calot must be cleared of fat and fibrous tissue. The second requirement is that the lowest part of the gallbladder should be separated from the cystic plate. The third requirement is that 2 structures, and only 2, should be seen entering the gallbladder. Once these 3 criteria have been fulfilled, CVS has been attained. (Strasberg and Brunt, 2010). This would have prevented accidental biliary and vascular injuries due to uncommon variations, incautious bleeding control or unclear anatomy, so the patient is protected precisely because the surgeon cannot usually achieve a misleading view (Vettoretto et al., 2011). So this technique is considered as the gold standard for resident teaching, because it has a lower rate of biliary and hemorrhagic complications, has a shorter operative time, builds self-confidence, and is a simple standardized method both for complicated and uncomplicated gallbladder lithiasis.

## Methods:-

### Patients:-

Between September 2015 to September 2016 out of all laproscopically treated patients in our surgical unit, a group of 30 patients was selected with chronic calcularcholecystitis. In patients, we registered neither with previous major abdominal open surgery or with advanced liver disease nor signs of acute cholecystitis; also, none of them was jaundiced. The patients were treated either with critical view of safety (CVS) technique or conventional infundibular (IN) technique. Comparison of patients' features in those treated with CVS technique and those treated with IN technique revealed no differences. Out of 30 patients included, 15 belonged to CVS group and 15 to IN group. The analysis was conducted in September 2016.

### Techniques:-

The patient is placed in a supine position. Pneumoperitoneum was created by blind puncture with a Veress needle through a subumbilical incision using carbon dioxide. 4 Ports were used. In CVS technique, the gallbladder is grasped and retracted cranially toward the right shoulder via the right flank port. Dissection of Calot's triangle from both its dorsal and ventral aspects is performed using both blunt and electrocautery dissection (Fig.A). Dissection of the gallbladder from the lower part of cystic plate is started from the presumed point of the infundibulum-cystic duct junction (Fig.B). After dissection was completed there were two structures entering the gallbladder, the duct and the artery (Fig.C). The artery then the duct clipped and divided. Then the gallbladder dissected off completely of the liver bed. In the IN technique, the fundus is retracted cranially toward right shoulder and the infundibulum is retracted laterally, the serosa is incised parallel to the cystic duct and artery, just caudally to the infundibulum edge, then dissecting the duct and artery to open Calot's triangle. Then the clips are applied on cystic duct and cystic artery after the identification of them. Then they are sectioned between clips, and retrograde cholecystectomy is completed. The gallbladder was placed in a retrieval bag and extracted through the subxiphoidal incision, which was enlarged if necessary. Hemostasis was achieved in the gallbladder bed, and after a thorough saline lavage, a tube drain was placed in cases with rupture gallbladder or intraoperative bleeding. The port incisions closed. All patients had a subhepatic drain for 1 day, started oral intake 6 hours postoperative. Routine postoperative follow up of all patients was done including, Vital signs, Leakage through the drains (bile or blood), Abdominal pain or distension or Wound infection.

## Results:-

The age of the studied patients in group (A) ranging from 25-56 years old with mean  $37.8 \pm 9.9$  and most of the studied patients are females (73.3%) and in group (B) ranging from 23-51 years old with mean  $39.5 \pm 8.2$  and most of the studied patients are females (73.3%). And so there is no significant difference regarding both age or sex. (Table 1) The mean operative time in group A was  $43.66 \pm 4.6$  and in group B was  $65.4 \pm 8.8$ . This shows that infundibular technique has significantly longer operative time (Table 2), This table shows no significant association between bleeding and groups (Table 3) as there is no intraoperative bleeding occurred in group A while there was intraoperative bleeding in one case in group B. There is no significant association as all cases with no intraoperative bile injury. (Table 4) as there is no bile duct injury in both groups. This study shows there is significant association as regard drain insertion between CVS and infundibular groups. (Table 5) as we put a drain in 4 cases in group A and 10 cases in group B. This study shows no significant association as all cases with no postoperative bile leak. (Table 6) Also this study shows no significant difference as all cases discharged on the 1<sup>st</sup> postoperative day, (Table 7).

**Table 1:-**Age and sex distribution among studied groups:

		Mean $\pm$ SD	Groups		Total	t/ $X^2$	P
			Group A CVS	Group B Infundibular			
Age		37.8 $\pm$ 9.9	39.5 $\pm$ 8.2			-0.051	0.61
Sex	Female	Count	11	11	22	0.00	1.0
		%	73.3%	73.3%	73.3%		
	Male	Count	4	4	8		
		%	26.7%	26.7%	26.7%		
Total		Count	15	15	30		
		%	100.0%	100.0%	100.0%		

**Table 2:-** Operative time distribution among groups:

	Group A CVS	Group B Infundibular	t	P
Operative time (min)	43.66 $\pm$ 4.6	65.4 $\pm$ 8.8	-8.44	0.00**

**Table 3:-**Intraoperative bleeding among groups :

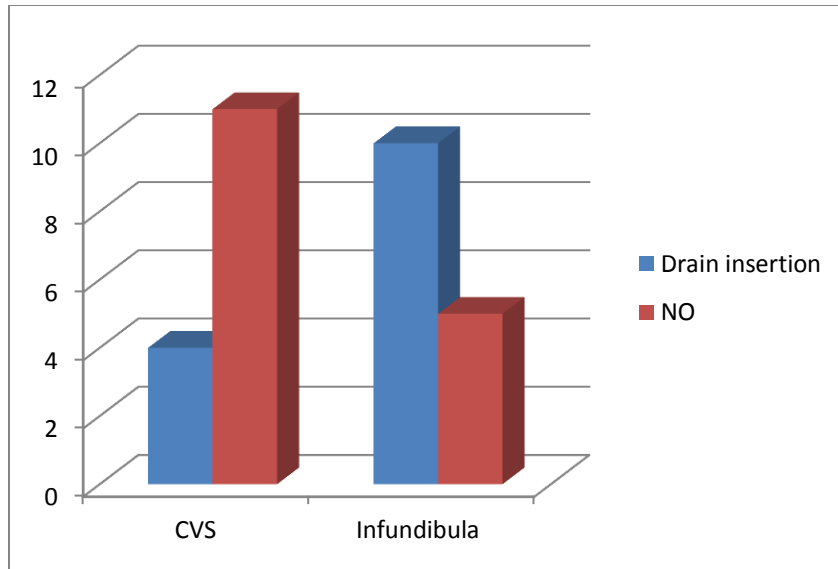
			Groups		Total	$X^2$	P
			Group A CVS	Group B infundibular			
Bleeding	No	Count	15	14	29	1.03	0.3
		%	100.0%	93.3%	96.7%		
	Yes	Count	0	1	1		
		%	0.0%	6.7%	3.3%		
Total		Count	15	15	30		
		%	100.0%	100.0%	100.0%		

**Table 4:-**Intraoperative bile injury distribution among groups.

			Groups		Total	$X^2$	P
			Group A CVS	Group B Infundibular			
Bile leak	No	Count	15	15	30	-----	-----
		%	100.0%	100.0%	100.0%		
	Yes	Count	0	0	0		
		%	0.0%	0.0%	0.0%		
Total		Count	15	15	30		
		%	100.0%	100.0%	100.0%		

**Table 5:-**Drain insertion distribution among groups.

			Groups		Total	$X^2$	P
			Group A CVS	Group B Infundibular			
Drain insertion	No	Count	11	5	16	4.82	0.02*
		%	73.4%	33.3%	53.3%		
	Yes	Count	4	10	14		
		%	26.6%	66.7%	46.7%		
Total		Count	15	15	30		
		%	100.0%	100.0%	100.0%		



This diagram shows difference regard drain insertion between groups .

**Table 6:-**Postoperative bile leak:

			Group		Total	X <sup>2</sup>	P
			Group A CVS	Group B Infundibular			
Bile leak	No	Count	15	15	30	-----	-----
		%	100.0%	100.0%	100.0%		
	Yes	Count	0	0	0		
		%	0.0%	0.0%	0.0%		
Total		Count	15	15	30		
		%	100.0%	100.0%	100.0%		

**Table 7:-**Hospital stay.

			Group		Total	X <sup>2</sup>	P
			CVS Group A	Infundibular Group B			
Stay	One day	Count	15	15	30	-----	-----
		%	100.0%	100.0%	100.0%		
	Prolonged	Count	0	0	0		
		%	0.0%	0.0%	0.0%		
Total		Count	15	15	30		
		%	100.0%	100.0%	100.0%		



Fig.A:-

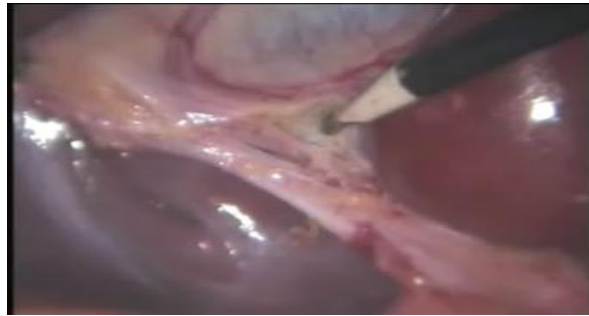


Fig.B:-



Fig.C:-

### Discussion:-

The introduction of laparoscopic cholecystectomy was associated with a sharp rise in the incidence of biliary injuries. Despite the advancement of laparoscopic cholecystectomy techniques, biliary injury continues to be an important problem today. The most common cause of serious biliary injury is misidentification. Usually, the common bile duct is mistaken to be the cystic duct and, less commonly, an aberrant duct is misidentified as the cystic duct. (Strasberg and Brunt, 2010). Many expert surgeons learn to perform procedures safely based on their experience. Above all, the critical view of safety (CVS) introduced by Strasberg in 1995 is the standard practice to prevent BDI during LC. The CVS is achieved by clearing all fat and fibrous tissue in Calot's triangle, after which the cystic structures can be clearly identified, occluded, and divided. (YAMASHITA et al., 2010). In the present study the age of the studied patients in group (A) ranging from 25-56 years old with mean  $37.8 \pm 9.9$  and most of the studied patients are females (73.3%) and in group (B) ranging from 23-51 years old with mean  $39.5 \pm 8.2$  and most of the studied patients are females (73.3%) (table 1). There was no significant difference as regard age and sex that are similar to Vettoretto et al., (2011) study. Also, in our study there was statistically significant difference as regard the operative time as cases managed using the critical view of safety technique have shorter operative time with mean  $43.66 \pm 4.6$  minutes than cases managed using the infundibular technique with mean  $65.4 \pm 8.8$  minutes. Our result goes with Vettoretto et al., (2011) study that found that there was a significant difference between both groups as regard the operative time in favour of the critical view of safety technique with median 51.5 minutes in

CVS versus 69.7 minutes in the infundibular technique. About intraoperative bleeding, there was no significant difference between both groups as there was only one case operated with the infundibular technique had intraoperative bleeding (6.75%) (table 3). **Vettoretto et al., (2011)** recorded two cases of intraoperative bleeding in the infundibular technique but no cases recorded while using the CVS technique. As regard Intraoperative bile injury there was no significant difference between both groups as there was no bile leak noticed in any case of both groups (table 4). **Yegiyants and Collins., (2008)** reported on 3,042 patients who had laparoscopic cholecystectomy using CVS for identification in the period 2002\_2006. There is only one case of bile duct injury occurred in an 80-year-old patient with severe inflammation. The injury occurred during dissection before the CVS was achieved, in other words there was no injury due to misidentification. As regard drain insertion, we used to put a drain in cases with rupture gallbladder or as a haemostatic procedure due to minor bleeding. There was significant difference between both groups as regard drain insertion as there was only four cases in group A closed with intra peritoneal tube drains (26.6%) but in group B as there was ten cases with drain insertion (66.7%) (table 5). But in **Vettoretto et al., (2011)** study drain was inserted in every case. In **Avgerinos et al., (2008)** study, CVS was applied in 998 patients of 1064 patients with drain insertion in 744 of all patients. **Vettoretto et al., (2011)** found only one case of bile leak from cystic duct managed by endoscopic sphincterotomy in CVS group. The infundibular technique had no bile leak. Also all cases were discharged in the 1<sup>st</sup> postoperative day. There was no significant difference between both groups (table 7). **Vettoretto et al., (2011)** found as regard discharge in both groups as all cases were discharged in the second postoperative day.

### Conclusions:-

- ❖ Using the critical view of safety has an important role in decreasing the operative time because of the safe accurate identification of the anatomy that allow the surgeon to proceed without fear of misidentification.
- ❖ Although there was no significant difference as regard bile duct injury between both techniques but we cannot deny the claimed role in decreasing these injuries as the number of patients in our study wasn't sufficient to detect the rate of bile duct injury with this technique so, multicenter trials with more large number of patients are required because of the low expected rate of the events.

### From the results obtained from this work we recommend:-

Using the CVS as a standard technique in all cases of LC to help in decreasing the rate of BDI and operative time. Also to use it in training hospital and residencies as it builds self-confidence to younger surgeons as it overcome the challenge of misidentification and make them feel more secure.

- ❖ Also we recommend a long term study and a multicenter study to prove obviously the role of the CVS in decreasing BDI.

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