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ORIGINAL RESEARCH

Comparison Study Of Extracorporeal Versus Intracorporeal Cystic Duct Ligation With Suture In Laparoscopic Cholecystectomy

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Abstract

Objective : The cystic duct of gall bladder in laparoscopic cholecystectomy can be occluded by metallic clips, harmonic scalpel, plasma kinetic, and by sutures. The suturing technique can be extracorporeal or intracorporeal suturing techniques. The objective of this study is to compare the Extracorporeal versus Intracorporeal types of cystic duct ligation with suture and the better out of the two.

Material methods: 100 patients coming for Laparoscopic cholecystectomy were randomised into the two groups ,one group A comprising of 50 patients, who underwent Extracorporeal ligation of cystic duct and other group B comprising of 50 patients who underwent intracorporeal ligation ofcystic duct.

Observation and results: It was observed that actual time for cystic duct ligation i.e from preparation of cystic pedicle to cutting of the Cystic Duct to be 4.41±0.64 minutes in Group A and 5.58±0.68 minutes in Group B. Duration of stay in the hospital in t group A was 2.00±0.76 days and that in Group B was 2.18±0.92 days. **Conclusion :** Thetechnique of ligation of cystic duct with suture is efficient for occlusion of cystic duct. It was concluded that Extra-corporeal CDL was a faster method of ligating the cystic duct associated with a faster learning curve as compared to Intra-corporeal CDL and lesser stay in hospital .

Key words: laparoscopic cholecystectomy, Extracorporeal, intracorporeal, cystic duct ligation

Introduction

Cholelithiasis is one of common hepatobiliary problem and laparoscopic cholecystectomy is gold standard treatment.[1] Traditionally, Laparoscopic cholecystectomy is performed by 4 port technique. Dissection of the gall bladder is done with the aim of achieving the critical view of safety .[2] The cystic duct and cystic artery can be occluded by the use of metallic clips but they present various issues including clip migration,[3] slippage, erosion of the CD, incomplete occlusion due to use of wrong size ofclips.[4] other alternatives to metallic clips are there such as harmonic scalpel, plasma kinetic, and intracorporeal and extracorporeal suturing techniques which have been tried with gratifying results. Extracorporeal suturing involves creation of a knot outside the abdominal cavity and its subsequent insertion into the abdominal cavity through the laparoscopic port and ligation of cystic duct. Intracorporeal cystic duct ligation means knotting the cystic duct with Vicryl suture inside the abdomen using Laparoscopic instruments.

Aims and Objectives

Comparison of Extracorporeal versus Intracorporeal cystic duct ligation with suture in Laparoscopic Cholecystectomy with respect to the following parameters: Operative Time,Ease and feasibility of procedure, Complications of the procedure . Immediate and early postoperative complications, Duration of stay in Hospital, Drain output, Post operativepain score This study aims at identifying the better alternative between the two methods of securing the cystic duct during laparoscopic cholecystectomy based on the above mentioned parameters.

Material and Methods

The present study was a prospective randomised study aimed at comparing the advantages and the disadvantages of Extracorporeal versus Intracorporeal cystic duct ligation with suture during standard four port laparoscopic cholecystectomy. 100 patients were selected as the study population and were divided into two groups randomly:

Group A: 50 Patients who underwent Extracorporeal CDL.
Group B: 50;Patients who underwent Intracorporeal CDL.
Inclusion Criteria . Age >18 years, All symptomatic patients, Patients fit for General Anaesthesia.
Exclusion Criteria: Patients with CBD stones, empyema gall bladder, gall bladder perforation, Patients with GB malignancy, Liver cirrhosis, Patients with other systemic illness like COPD, Cardiac diseases, etc, Pregnancy, Patients unfit for General Anaesthesia, Previous major abdominal surgeries, Refused consent

Operative Technique
Laparoscopic cholecystectomy : Standard Four Port technique
A 10 mm infraumbilical port was made for camera, followed by one 10 mm epigastric port, and two 5 mm ports, first placed around 2 finger breath below costal margin at the mid-clavicular line, second at the lumbar region at the level of umbilicus. Haemostasis was maintained all throughout and bleeding vessels were cauterized with diathermy. Cystic artery was secured with ligature or sealed with diathermy and cut.
Based on the aim of the present study the patients were randomly divided into two groups,Group A – Patients undergoing Extracorporeal CDL.
Group B – Patients undergoing Intracorporeal CDL.

Extracorporeal CDL
Vicryl 1-0 is inserted into the peritoneal cavity through the 10 mm working port and one end of the same was kept outside the peritoneal cavity. The suture was then passed behind the cystic duct and brought out through same port. The two ends of the suture were then tied and a Roders Knot was made and passed with the help of Maryland and finally placed and fastened near the cystic duct and CBD junction. The Maryland was then brought outside, and the excess suture was cut with the help of scissor. Two more knots were placed in a similar fashion over the cystic duct about 1-2mm from the previous knot. Cystic duct was then cut between the second and third ligature.


Extracorporeal cystic ligation

Intracorporeal CDL
A suture was prepared for tying by cutting the full length of a 75-cm long 2-0 vicryl into 4 equal portions. The suture was fed on a needle holder through the epigastric portand was retrieved under the cystic duct with the help of a Maryland placed from the MCL line port. The instruments were repositioned by bringing them together closer to the knot and were pulled in opposite directions with equal force to create a flat surgical knot. A similar set of 2 surgical knots were placed near the junction of the cystic duct with the common bile duct, and the cystic duct was divided at a safe distance between the proximal and distal suture.


Intracorporeal cystic duct ligation

Observation and Results

Out of 100 patients, 50 were in the group A for Extracorporeal ligation of cystic ductand 50 patients were in group B for intracorporeal ligation of cystic duct during Laparoscopic Cholecystectomy. Both groups were matched for age , sex, operative timefor cystic duct, drain output, pain score and duration of stay. The mean age observed in group A was 38.86 years and in group B was 38.26 years.there is a female preponderance, with 84% females in Group A and 78% females in Group B. 2 patients in group A were more than 60years and 4 patients in group B were more than 60 years. Actual time for cystic duct ligation i.e from preparation of cystic pedicle to cutting of the Cystic Duct to be 4.41±0.64 minutes in Group A and 5.58±0.68 minutes in Group B. On statistical analysis the p-value was found to be 0.001, which was significant. i.eintracorporeal cystic ligation took more time than Extracorporeal cystic ligation. Mean drainoutput during the first 24 hours in Group A was 15.20±10.74 ml and that in group B was 15.40±10.73 ml which is well matched in both. It was concluded that ligation of cystic duct with suture is efficient technique for cystic duct ligation as drain out was minimal in both groups. On comparison of the two groups based on there pain scores, the mean Painscore of Group A was 3.36±1.78 and that of group B was 3.46±1.74. On statistical analysisthe p-value was calculated to be 0.685. This was statistically non-significant proving that there is no difference in the pain profile between the two groups. We observed the mean duration of stay in the hospital in group A was 2.00±0.76 days and that in Group B was 2.18±0.92 days. On statistical analysis the p-value was found to be 0.363, which was not statistically significant proving no difference in the duration of stay between the two groups.

Table 1

Total Drain Output	Group A		Group B	
	Patients	Percentage	Patients	Percentage
0-50	45	90%	42	84%
60-100	5	10%	8	16%
Total	50	100%	50	100%
Mean±SD	31.80±18.26		35.40±20.22	
Median	30.00		30.00	
Range	10-100		0-100	
Mann-Whitney U Test	0.983			
p value	0.326			

Drain output shown in table 1 in study groups

Table 2

Operative Time	Extracorporeal Knotting		In tracorporeal Knotting	
	Patients	Percentage	Patients	Percentage
3.0-3.59	10	20%	0	0%
4.0-4.59	28	56%	6	12%
5.0-5.59	11	22%	29	58%
6.0-6.59	1	2%	13	26%
7.0-7.59	0	0%	2	4%
Total	50	100%	50	100%
Mean± SD	4.41±0.64		5.58±0.68	
Median	4.39		5.46	
Range	3Min 30Sec- 6Min 10Sec		4Min 22Sec -7Min 45Sec	
Mann-Whitney U Test	6.940			
p value	0.001			

Operative time in two groups is shown in table no 2

Ease and Feasibility	Group A		Group B	
	Patients	Percentage	Patients	Percentage

Duration of Stay	Group A		Group B	
	Patients	Percentage	Patients	Percentage
1 Day	12	24%	11	22%
2 Day	28	56%	24	48%
3 Day	8	16%	11	22%
4 Day	2	4%	3	6%
5 Day	0	0%	2	4%
Total	50	100%	50	100%
Mean±SD	2.00±0.76		2.18±0.92	
Median	2.00		2.00	
Range	1 Day- 4 Day		1 Day – 5 Day	
Mann-Whitney U Test	0.910			
p value	0.363			

Adhesions	7	14%	5	10%
Mucocoele	1	2%	2	4%
No	42	84%	43	86%
Total	50	100%	50	100%

Age Group (Years)	GroupA		GroupB	
	Patients	Percentage	Patients	Percentage
21-30 Years	10	20%	10	20%
31-40 Years	23	46%	25	50%
41-50 Years	12	24%	11	22%
51-60 Years	3	6%	0	0%
≥61 Years	2	4%	4	8%
Total	50	100%	50	100%
Mean±SD	38.86±10.43		38.26±11.44	
Median	37.50		36.00	
Range	21-75		21-75	
t-test	0.274			
p value	0.785			

X^2	1.550
p value	0.818

Age distribution in group A and B

Duration of stay in hospital in Group A and B

Discussion

The time taken for the actual ligation of the CD with the suture after achieving the critical view of safety in group A was 4.41±0.64 minutes and that in Group B was 5.58±0.68 minutes. Though the time taken for IC CDL reduced with the number of cases performed. Marane et al[5] · also reported the operative time to 2-8 minutes (mean 4.03min) in the group undergoing IC CDL. In a study conducted by Riaz et al,[6] they observed the mean operating time in metal clip group was 2.53 + 0.5 minutes compared to intracorporeal ligation group which was 4.79 + 1.5 minutes, suggesting the time taken for intracorporeal knotting to be significantly more. Singal et al[7] also reported the mean time for Intracorporeal CDL with suture to be 2.50 minutes while the time taken for clip application was 1.50 minutes. The difference between the two groups was calculated to bestatistically significant, suggesting more time was taken for IC CDL as compared to Clip application. In yet another study conducted by Bali et al,[8] they observed the time required far suture ligation was 6.5 minutes and that for clip application was 4 minutes. Shah et al[9] also observed the time taken for Intracorporeal tie varied from 2 to 7 minutes, with an average of 3 minutes. The total operative time varied due to the difference in the local milieu, that is the presence of surrounding adhesions, the status of the gall bladder, presence of aberrant anatomy in the calot's region and other patient related factors. Hence the use of the time taken for the actual ligation of the cystic duct provides a better picture as to the ease and feasibility of the two procedures performed removing the anatomical bias involved to a certain extent. The time taken for EC CDL was significantly lower than the time required forIC CDL as Intracorporeal suturing is an advanced laparoscopic skill and has a longer learning curve. In the present study too the time taken for intracorporeal suturing reduced as the number of cases performed progressed. The total time taken for Laparoscopic cholecystectomy in Group A was 42.28±2.89 minutes while that in Group B was 46.93±2.38 minutes. In a study conducted by Singh et al,[10] the total mean operative timein the group undergoing EC CDL was 60.5 minutes and that for the patient that underwent metallic clip ligation was 47.83 minutes. Deepak et al[11] conducted another study wherein the patients who underwent CDL by clips had a mean operative time of 46.6 minutes and for the patients who underwent CDL with IC CDL with suture the mean operative time was 70.7 minutes. In a study conducted by Kumar et al,[12] where the authors noted the time taken for Laparoscopic cholecystectomy with EC CDL in one group to be 43.32±4.44 minutes as compared to the time taken for occlusion by metallic clips that was 40.44±4.63 minutes. In another study conducted by Leo et al,[13] the mean operative time for metallic clip ligation was 51 minutes 32 seconds and it was 57 minutes 42 seconds in patients who underwent Suture ligation of CD. The post operative pain score was similar in both the groups with VAS score being 3.36±1.78 in group A and 3.46±1.74 in group B. In a similar study conducted by Harvesh et al,[14] the post-operative pain in 12-24 hours was less in both Groups, the group with use of metallic clips for CDL the VAS was 3.65±0.64 and for the patients who underwent CDL with EC suture was 3.69±0.77. In this study there wereno complications that incurred either intraoperatively or postoperatively. All patients were discharged in clinically satisfactory condition. This is similar to the study conducted by Ismail et al,[15] where they too observed no complications post operatively. There was no perioperative bile duct injury, no post operative bile leakage, intraperitoneal collection, or jaundice. The patients enrolled in the present study had a mean duration of stay of 2.00±0.76 days in group A and 2.18±0.92 days in group B. Mean drain output during the first 24 hours in Group A was 15.20±10.74 ml and that in group B was 15.40±10.73 ml which is well matched in both. In a similar study conducted by Singh et al,[8] the mean duration of hospital stay was found to be 2.70 days in group A where Extracorporeal knotting was done to secure the cystic duct and 2.73 days in group B where the cystic duct was secured with metallic clips. In a study conducted by Bali et al,[8] they noted similar duration of hospital stay that was 2-3 days in patients undergoing CDL with suture and in another group CD occlusion by metallic clips. **Conclusion.** The technique of ligation of cystic duct with suture is efficient for occlusion ofcystic duct. The present study concluded that Extra-corporeal CDL was a faster method of ligating the cystic duct associated with a faster learning curve as compared to Intra- corporeal CDL. But with similar post-operative outcome and complication profile. BothExtracorporeal and Intracorporeal CDL are relatively cost effective ways of securing the CD as compared to the use of metallic clips in LC.

Declaration of patients consent: The author certify that they have obtained all appropriate patient consent forms. In theform patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflict of interest

There are no conflicts of interest

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