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Does Post-laparoscopic Cholecystectomy Intra-abdominal Drain Reduces Postoperative Shoulder Pain?

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Abstract

Background In the context of the much-heralded advantages of laparoscopic surgery, it can be easy to overlook post-laparoscopy pain as a serious problem, yet as many as 80% of patients will require opioid analgesia. It is generally accepted that pain after laparoscopy is multifactorial, and the surgeon is in a unique position to influence many of the putative causes by relatively minor changes in technique.

Objective To determine whether a drain placed in the peritoneal cavity during laparoscopy is both clinical and cost-effective method of reducing postoperative shoulder pain.

Methods One hundred female patients were having laparoscopic cholecystectomy were divided into two groups, a control group (50 patients) where no intra-peritoneal drain was inserted and second group (50 patients) in which the patients had intra-peritoneal gas drain sited in the subhepatic area. Patients' age, weight, height, operative time, total amount of CO_2 and amount of analgesia used were recorded for each patient in both groups. Shoulder pain was assessed using visual analogue score (VAS) from 1-5 scale at 4, 8, 24 & 48 hours postoperatively, where as abdominal pain was assessed at 48 hour post-operatively. pH of the abdominal fluid was assessed in the second group of patients by using pH meter 48 hours postoperatively.

Results Shoulder pain may occur in many of patients of the control group more frequent than those of the second group, where as postoperative abdominal pain was found to be greater in patients with subhepatic drain after laparoscopic cholecystectomy.

Conclusion Low-cost drain decreased the frequency of shoulder pain and reduced the need for analgesia, but increases the abdominal pain; however it is less cost-effective than simple oral analgesia after laparoscopy.

Keywords laparoscopic cholecystectomy, intra-abdominal drain, shoulder pain

Introduction

Laparoscopic procedures, compared to laparotomies, are associated with lower morbidity, shorter hospitalizations, smaller incisions, earlier return to normal activity, and less postoperative pain [(1-4)].

Carbon dioxide has been the favored gas used to create pneumo-peritonium because of its high solubility in the blood and the fact that it does not support combustion. Although the physiologic problems resulting from carbon dioxide are well documented, they are becoming of more concern in long extensive laparoscopic procedures in elderly and debilitated patients [(5)].

Release of gas at the end of the operation is inefficient regardless of the method used [6]. After laparoscopy, CO_2 gas remains within the peritoneal cavity for a few days [7], commonly causing pain at this time [7,8] particularly soon after the start of activity and ambulation [9].

The pain is thought to be due to peritoneal irritation by carbonic acid and to the creation of space between the liver and the diaphragm, leading to loss of suction support of the heavy liver.

Several studies have shown benefits from preoperative methods for reducing abdominal and shoulder pain after laparoscopic cholecystectomy, but the problem is under investigation [10-13].

Methods

A prospective randomized controlled study was carried out in Al-Kadhmyia Teaching Hospital, Baghdad, Iraq from April 2009 until January 2010 involving 100 female patients, of age ranging from 20 to 55 years (mean =37.5), all of them were having laparoscopic cholecystectomy. They were divided into two groups, first group (involving 50 patients) was considered to be the control group, where no intra-peritoneal drain was inserted, and second group (50 patients) was the group in which the patients had intra-peritoneal gas drain sited in the sub-hepatic area. Cases with real indications for drain post-laparoscopic cholecyst-ectomy (suspected bile or blood leak) were excluded from the study. Cases involved in the study were uncomplicated and have no other associated diseases (diabetes mellitus, hypertension and ischemic heart diseases) and were approved about the study.

Patients age, weight, height, operative time, total amount of CO_2 used were recorded for each patient in both groups. Shoulder pain was assessed using visual analogue score (VAS) from 1-5 scale at 4, 8, 24 and 48 hours postoperatively, where as abdominal pain was assessed at 48 hour postoperatively.

Drains were removed and patients of the two groups were discharged after 48 hour post-operatively. pH of the abdominal fluid was assessed in the second group of patients by using pH meter. The type and amount of analgesia needed in the two groups was recorded.

Statistical analysis

All data were collected and analyzed by using SPSS. Statistical analysis was performed using Chi-squared test to compare discrete variables and two tailed paired Student's t-test to compare continuous variables between groups. $P < 0.05$ was considered statistically significant for all tests.

Results

The study involved 100 female patients having laparoscopic cholecystectomy; they were of age ranging from 20-55 years, as seen in Table 1 and Figure 1.

The patients of both groups of the study were of weight ranging from 69.7 to 84.38 kg, and of height from 161.7 to 163.1 cm , and consequently of body mass index (BMI) ranging from 25.6 to 26.5 as seen in Table 1 and Figures 2,3,4.

Volume of CO_2 used in both groups of the study was shown in Table 1 and Figure 5.

Operative time in both groups of the study was recorded and shown in Table 1 and Figure 6.

pH of the abdominal fluid was assessed in the second group of patients and shown in Table 1.

The type and amount of analgesia needed in the two groups was recorded and shown in Table 2.

Shoulder pain was assessed at 4, 8, 24 and 48 hours postoperatively, where as abdominal pain was assessed at 48 hour post-operatively as shown in Tables 2, 3, and 4 also seen in Figure 7.

Table 1: distribution of age, weight, height, BMI, CO_2 amount and operative time in both groups of the study and pH values in patients of group 2 only

	Study groups	N	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
Age	Without drain	50	32.32	7.386	1.044	0.212
	With drain	50	30.58	6.443	0.911	
Weight	Without drain	50	84.38	99.760	14.108	0.304
	With drain	50	69.70	12.193	1.724	
Height	Without drain	50	161.7	5.832	1.323	0.521
	With drain	50	163.1	6.324	1.285	
BMI	Without drain	50	25.6	2.443	0.943	0.426
	With drain	50	26.5	3.754	0.954	
CO_2 amount	Without drain	50	42.12	7.441	1.052	0.894
	With drain	50	41.92	7.586	1.073	
Operation time	Without drain	50	28.00	8.981	1.270	0.926
	With drain	50	28.14	5.668	0.802	
pH	With drain	50	6.8	1.546	0.654	

Table 2: Analgesia needed abdominal pain score and shoulder pain score at 4, 8, 24 and 48 hours post operatively in patients of both groups of the study

	Pearson Chi-Square Tests	Study groups
Analgesia needed	Chi-square	0.332
	df	2
	Sig.	0.847
Abdominal pain score	Chi-square	23.522
	df	3
	Sig.	0.000
Shoulder pain score 4 hrs	Chi-square	34.213
	df	4
	Sig.	0.000
Shoulder pain score 8 hrs	Chi-square	37.690
	df	3
	Sig.	0.000
Shoulder pain score 24 hrs	Chi-square	40.527
	df	3
	Sig.	0.000
Shoulder pain score 48 hrs	Chi-square	0.062
	df	2
	Sig.	0.970

Table 3: Shoulder pain score in both groups of the study at 4, 8, 24, 48 hours post-operatively

	Study groups															
	Without drain								With drain							
	4hrs		8hrs		24hrs		48hrs		4hrs		8hrs		24hrs		48hrs	
Shoulder pain score	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
1	8	16%	8	16%	7	14%	35	70%	30	61%	31	62%	33	66%	36	72%
2	13	27%	13	26%	14	28%	11	22%	15	31%	17	34%	15	30%	10	20%
3	24	49%	25	50%	25	50%	4	8%	3	6%	2	4%	2	4%	4	8%
4	4	8%	4	8%	4	8%	0	0%	1	2%	0	0%	0	0%	0	0%
Total	49	100%	50	100%	50	100%	50	100%	49	100%	50	100%	50	100%	50	100%

Table 4: Chi-square test of shoulder pain score of both groups of the study

Pearson Chi-Square Tests			
		Without drain	With drain
Shoulder pain score	Chi-square df Sig.	59.298 9 0.000	6.526 9 0.686

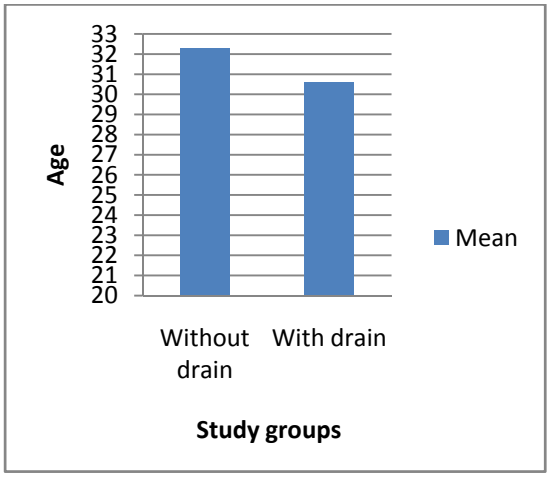

Figure 1: Age distribution in both groups of the study

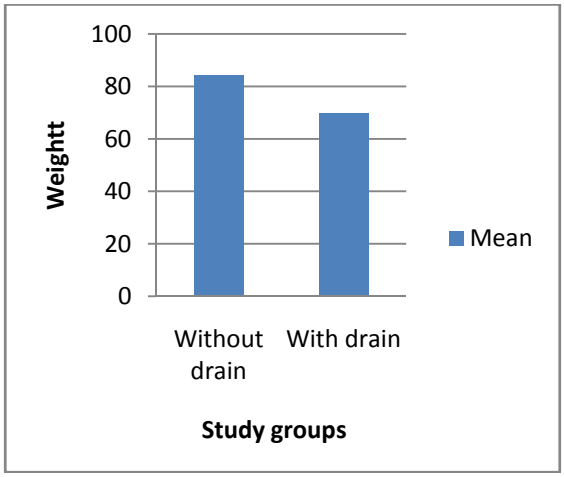

Figure 2: Weight distribution in both groups of the study

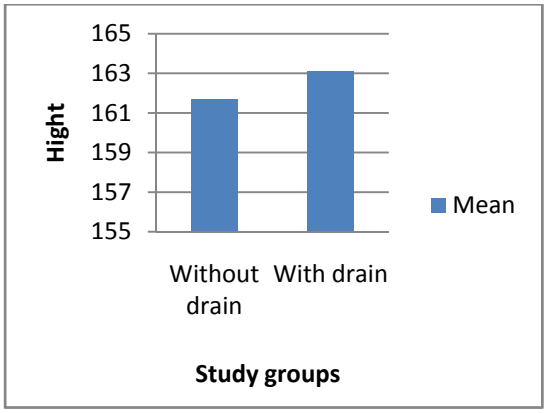

Figure 3: Height distribution in both groups of the study

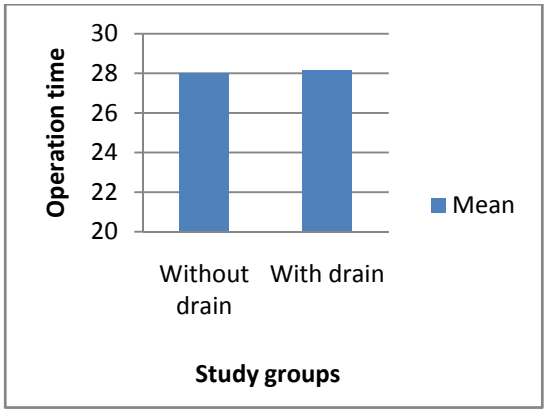

Figure 6: Operative time in patients of both groups of the study

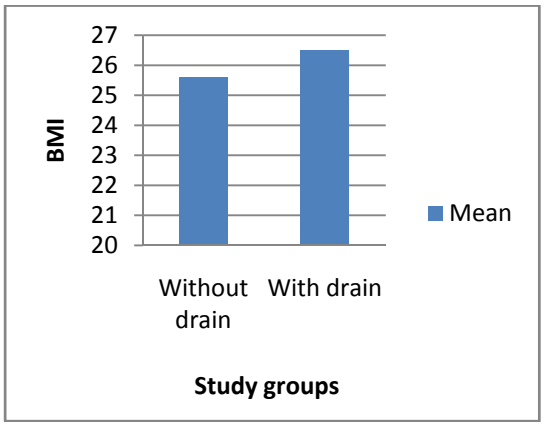

Figure 4: BMI of patients in both groups of the study

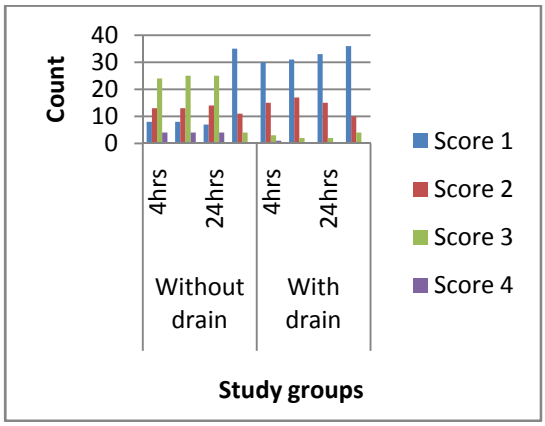

Figure 7: VAS score of shoulder pain in both groups of the study at 4, 8, 24, 48 hours post-operatively

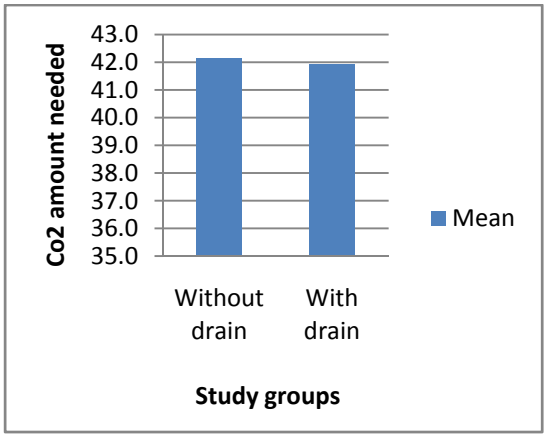

Figure 5: Amount of CO_2 needed in patients of both groups of the study

Discussion

This prospective randomized study was carried out on 100 female patients; they were uncomplicated and have no other associated diseases. They were divided into two groups, control group (50 patients) where no intra-peritoneal drain was inserted and second group (50 patients) in which the patients had intra-peritoneal gas drain sited in the sub-hepatic area.

Patients of two groups of the study were well matched for age, weight, height, BMI, volume of CO_2 needed, operative time and amount of analgesia needed, as shown in Figures 1, 2, 3, 4, 5 and 6 and seen in Tables 1and 2, where

the standard error mean difference is not significant. The fact that the above parameters are not significant is also mentioned by other studies [1,4,6,10,12].

Shoulder pain was assessed in this study by using visual analogue score (VAS) from 1-5 scale at 4, 8, 24 & 48 hours postoperatively as shown in Tables 2, 3, and 4 also seen in Figure 7.

Pain after laparoscopy may be transient or persist for at least three days [3,5]. Shoulder pain may occur in as many as 63 % [1], or as few as 35% of patients [8]. Prolonged presence of shoulder tip pain suggests excitation of phrenic nerve [3,5,8]. This pain can be reduced by aspiration of gas under diaphragm by the use of gas drain [2]. Low-pressure CO_2 pneumoperitonium reduces the number of patients complaining of shoulder-tip pain and the intensity of the pain after laparoscopic cholecystectomy [4,7]. The addition of intraperitoneal normal saline infusion to low-pressure CO_2 pneumoperitonium seems to reduce the intensity but not the frequency of shoulder-tip pain after laparoscopic cholecystectomy [11,13].

Suxamethonium used during anesthesia may cause pain across the shoulder but its avoidance is not associated with a reduction of pain score [7,9,13].

Abdominal pain was assessed 48 hours postoperatively by using visual analogue score (VAS) as in Table 2. Postoperative abdominal pain was found to be greater in patients with subhepatic drain after laparoscopic cholecystectomy, as suggested by other studies [7,11].

Drain use after elective laparoscopic cholecystectomy increases wound infection rates and delays hospital discharge. There is no evidence to support the use of drain after laparoscopic cholecystectomy as some papers stated higher wound infection ratio in drain group in comparison to non drain group [9,11,13].

The routine use of a drain in elective laparoscopic cholecystectomy has nothing to offer, in contrast, it is associated with increased pain. It would be reasonable to leave a drain if there is a worry about an unsolved or potential bile leak [4,6,11]. Subdiaphragmatic drain offers only minor, if any, benefit on postoperative pain, nausea and vomiting after laparoscopic cholecystectomy, and this effect is probably clinically irrelevant [1,2,5,13].

Shoulder pain is significantly lower in the second group probably due to aspiration of dissolved CO_2 in the subhepatic area and less formation of carbonic acid which irritant to diaphragm and subsequent less shoulder pain and this was confirmed by measuring pH of aspirated fluid through intra-abdominal drain which was mostly towards the acidic side [5,8]. On the other hand, shoulder pain is more in the first group (control group), the presence of intra-abdominal drain leads to mild to moderate discomfort (pain) which needs some sort of analgesia which is nearly equal to that used in the absence of drain [4,6,11].

From the above we can conclude that a low-cost drain decreased the frequency of shoulder pain and reduced the need for analgesia, however it is less cost-effective than simple oral analgesia after laparoscopy. Removal of as much intraperitoneal gas as possible before incision closure, in conjunction with postoperative analgesics, analgesics, remains the best practice for reducing postoperative pain.

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