Major Complications During Laparoscopic Cholecystectomy

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Citation

G Marakis, T Pavlidis, E Aimoniotou, K Ballas, K Psarras, D Karvounaris, S Rafailidis, H Demertzidis, A Sakantamis. *Major Complications During Laparoscopic Cholecystectomy*. The Internet Journal of Surgery. 2005 Volume 8 Number 1.

Abstract

Background: Laparoscopic cholecystectomy may lead to serious complications, some of which can be disastrous if they are not recognized and managed immediately.

Methods: Over the past 12-year period, 1225 laparoscopic cholecystectomies were performed applying the four-trocar American technique and Veress needle for the carbon dioxide pneumoperitoneum creation.

Results: Totally, major complications occurred in 19 cases (1.5%). The conversion rate was 7.4%. Complications included common bile duct injury in two cases (0.16%), vessel injury by trocar or Veress needle in four cases (0.32%) including one case of aorta injury (0.08%), bleeding from the gallbladder bed or the cystic artery in 10 cases (0.8%), bile leak in one case (0.08%), duodenum injury in one case (0.08%), and transient liver ischemia in one thalassaemic patient (0.08%). The complication was recognized during the operation in 11 cases. Re-operation was necessary in 5 cases (0.4%) and conservative management was applied in 3 cases. The course was uneventful in all patients except one death from cerebral vessel attack (mortality 0.08%). The mean hospital stay was 8.5 days (range 3-14).

Conclusions: Although infrequent, major complications may occur during laparoscopic cholecystectomy. Immediate recognition and management is critical and may lead to a safe outcome.

INTRODUCTION

The advantages of minimal invasive surgery have established laparoscopic cholecystectomy as the method of choice in the management of symptomatic cholelithiasis. Progress in materials and techniques over the past fifteen years resulted in gradually improved results ([1],[2],[3]). However, major complications may still account for morbidity as high as 2,9% ([4]). They appear to be related either to the procedure itself or to the creation of the pneumoperitoneum.

The group of complications related to the procedure, mainly includes bleeding from the gallbladder bed or the cystic artery, and biliary complications i.e. spilled gallstones, biliary leak, and common bile duct injury ([4],[5],[6],[7],[8],[9],[10]).

The latter group, accounting for up to 50% of all complications, mainly includes bleeding from trocar sites, and major vessel or visceral injury; it is usually caused by the blind insertion of the Veress needle or the first trocar ([4],[11],[12],[13],[14]).

Rarely, the increased intraabdominal pressure or the carbon dioxide effect may induce severe side-effects in critical patients ([15]), associated with the cardiovascular and respiratory systems ([16]).

In this study we present our large cumulative experience on laparoscopic cholecystectomies, analyzing the associated major complications and their management.

MATERIALS AND METHODS

In this University Department of Surgery, laparoscopic cholecystectomy was performed in 1225 patients suffering from symptomatic cholelithiasis over a twelve-year period (June 1993 to May 2005). The mean patient age was 57 years (range 17- 88). The data of all patients were reviewed retrospectively to find those with major complications.

Laparoscopic cholecystectomy was performed with the

patient in a slight reverse Trendelenburg position with the 4-trocar technique, according to the ‘‘American'‘ variable. The pneumoperitoneum was created by insufflation of warm carbon dioxide via an inserted Verres needle. Intraabdominal pressure was maintained stable at 12 mm Hg. A drain was routinely applied as well as antibiotic prophylaxis. Antithrombotic prophylaxis was not routinely given.

RESULTS

The number of operations and related complications per year are shown in Table 1, whereas details of patients with complications and their management are shown in Table 2. In 91 cases (7.4%) the laparoscopic procedure was necessary to be converted to open operation. Totally, 19 major complications (1.5%) occurred in 13 women and 6 men; at mean age of 56 (range 31-79). They included common bile duct injury in two cases (0.16%), trocar or Veress needle vessel injury in four cases (0.32%), bleeding from the gallbladder bed or the cystic artery in 10 cases (0.8%), bile leak in one case (0.08%), duodenum injury in one case (0.08%), and transient liver ischemia in one thalassaemic patient (0.08%).

Figure 1

Table 1: Number of laparoscopic cholecystectomies and relative complications distributed per year.

Year	Operations (n)	Complications (n)	Incidence (%)
1993 (from June)	4	0	0
1994	28	1	3.6
1995	42	0	0
1996	43	2	4.6
1997	69	3	4.3
1998	75	3	4
1999	139	0	0
2000	176	2	1.1
2001	167	1	0.6
2002	160	2	1.2
2003	149	3	2
2004	131	2	1.5
2005 (until May)	42	0	0
Total	**1225**	**19**	**1.5**

Figure 2

Table 2: Details of all patients with major complications during laparoscopic cholecystectomy.

no.	year	sex	age	lap.cholecystectomy	complication	management	hosp. Stay (days)	outcome
1.	1994	W	65	Yes, usual	bile leak	conservative drainage	10	well
2.	1996	M	40	Yes, usual	bleeding (mesentery trocar injury)	conversion hemostasis	5	well
3.	1996	M	79	Yes, usual	bleeding (gallbladder bed)	re-operation hemostasis	7	well
4.	1997	M	64	No	bleeding (mesentery Veress needle injury)	conversion, hemostasis cholecystectomy	8	well
5.	1997	W	63	Yes, usual	bleeding (gallbladder bed)	re-operation hemostasis	8	well
6.	1997	W	73	No, adhesions	bleeding (gallbladder bed)	conversion, hemostasis cholecystectomy	8	well
7.	1998	W	67	Yes, usual	large lateral abdomi-nal wall hematoma	conservative blood transfusion	8	well
8.	1998	W	76	Yes, difficult adhesions	bleeding (gallbladder bed)	re-operation hemostasis	9	well
9.	1998	W	68	Yes, usual	bleeding (gallbladder bed)	re-operation hemostasis	7	well
10.	2000	W	50	Yes, usual	partial CBD transe-ction	conversion repair+ T-tube	14	well
11.	2000	W	29	No	bleeding (aorta Veress needle injury)	conversion, injury repair cholecystectomy	7	well
12.	2001	W	61	Yes, usual	bleeding (cystic artery branch)	conversion hemostasis	9	well
13.	2002	M	39	No, gallbladder empyema	bleeding (gallbladder bed)	conversion, hemostasis cholecystectomy	3	well
14.	2002	W	57	Yes, difficult, duodenal adhesions	peritonitis (duodenal perforation)	re-operation injury repair	13	well, gallbladder carcinoma
15.	2003	W	46	Yes, adhesions	complete CBD transection	conversion, Roux-en-Y hepaticojejunostomy	9	well
16.	2003	M	55	Yes, liver cirrhosis	postoperative bleeding	conservative, FFP, blood transfusion	8	well
17.	2003	M	42	Yes, difficult, thalassemia	transient right liver ischemia	conservative	13	well
18.	2004	W	31	No, difficult, liver cirrhosis	bleeding (Calot's triangle)	conversion, hemostasis cholecystectomy	5	well
19.	2004	W	62	Yes, difficult, morbid obesity	bleeding (gallbladder bed)	conversion, hemostasis	10	well

The complication was recognized during the laparoscopic procedure, which had to be converted to open operation in 11 cases (58%). They included the two cases of bile duct injury, two cases of mesenteric vessel injury, one case of aorta injury, and five cases of gallbladder bed or cystic artery bleeding.

The complication was recognized after the operation in the rest eight cases; re-operation was necessary in five of them, including four cases of gallbladder bed bleeding and the case of duodenal injury. In the last case the histology revealed gallbladder carcinoma. The re-operation rate was 0.4%. Conservative management was enough in three cases; two bleeding cases (lateral abdominal wall and intraperitoneal) which were managed by blood transfusion, and the case of liver ischemia.

The course of all patients, after the management of their complication, was uneventful. The mean hospital stay was 8.5 days (range 3-14). Apart from the described complications there was one death (mortality 0.08%) in a healthy 60 years old woman who underwent an otherwise successful laparoscopic cholecystectomy without any difficulty. Computed tomography detected subarachnoid hemorrhage and cerebral stem invagination.

DISCUSSION

It is well known that during laparoscopic cholecystectomy few major complications i.e. common bile duct or major vessel injury may have serious consequences and disastrous results. Bile duct injury ranges from mild to severe and progress in laparoscopic techniques has decreased the risk to almost that of open procedures. The recognized risk factors for biliary complication include adhesions from previous inflammation and hard dissection in the Calot's triangle, gallbladder empyema, liver cirrhosis, thalassemia, and morbid obesity. Its incidence has been reported between 0.3% and 0.6% ([2,3,17,18,19,20]). Recent ten-year national survey from the U.S.A. shows an average rate of bile duct injuries requiring an operative repair of 0.15%; it appears to be decreasing over the years, but it continues to be associated with a significant mortality rate ([18]). In our study this incidence was 0.16%. Immediate recognition of this injury is of great importance ([20,21]) and a high bilioenteric repair is optimal in most cases ([22]). This remark was confirmed by our own experience; intra-operative recognition and proper repair contributed well to successful final outcome in the two described cases.

Due to the subumpilical site of the Veress needle insertion and the first trocar entrance, the major vessels, which can be injured are aorta, inferior vena cava and ileac vessels. This vessel injury may cause life threatening severe hemorrhage ([23]). The incidence of major vascular injury is 0.07%-0.4%, whereas the incidence of minor injury i.e. epigastric, mesenteric or omental vessels is 0.1%-1.2% ([24]). In this study the incidence of injury for major vessel (aorta) was 0.08%; for minor vessel injury (mesenteric, epigastric) was 0.24%. The immediate repair of the aorta injury without any delay was life saving in our case. A sudden fall of the arterial pressure during the laparoscopic procedure should alert the surgeons as well the anesthesiologists for immediate opening of the abdomen.

Among the viscera the highest risk of injury have the small bowel, liver, stomach, colon, duodenum, mesentery, spleen, and urine bladder ([26]). Our case of duodenal injury is not related with the entry, but with the hard dissection due to adherent gallbladder.

The open method of Hasson which permits direct vision for the first trocar placement and safe creation of the pneumoperitoneum contributed to considerable limitation of the above-mentioned vascular or visceral injuries. Hasson, in his thirty-year experience since 1970, has reported none vascular injury but one case of small bowel injury (0.02%); it was recognized immediately and repaired ([27]). In a large collective review study, out of 489.335 laparoscopic procedures performed with the closed method (Veress needle) the incidence of major vessel injury was 0.075% and that of visceral injury was 0.083%. In contrast, out of 12.444 laparoscopic procedures performed with the open method of Hasson the incidence of major vessel injury was 0, and that of visceral injury was 0.048% ([28]). The described complications related to the use of the Veress needle has led us to abandon it; recently, we perform routinely the open method of Hasson in all cases.

The incidence of bile leak after laparoscopic cholecystectomy ranges between 0.2% and 2%, and may cause intra-abdominal collections, fistula formation or life threatening bile peritonitis ([7]). It usually comes from the cystic duct stump due to misplacement of the clips, from common bile duct injury or from a missed accessory duct or small bile ducts of the gallbladder bed, i.e. Luschka's duct. Diagnosis and treatment of bile leak from an aberrant bile duct may be delayed ([9]). In diffuse peritonitis open surgery is mandatory ([25]). In this study the rate of considerable bile leak was below 0.1%; minor leaks were more common.

In this study complications related to carbon dioxide pneumoperitoneum and increased intra-abdominal pressure did not really occur, except a cerebral vessel attack case, which leaded to death in a patient with possible predisposition ([15]). This is just a hypothesis, which cannot be proved or even predicted. In our series, the mortality rate (0.08%), as well as the morbitity, were low and acceptable ([4]). The reported major complications raised the morbitity to 1.5%; they prolonged hospital stay, but without any further unwilling consequences. Obviously, the final satisfactory outcome depends on the immediate management.

It may be of interest to mention here two extra cases, who were transferred to our department after laparoscopic cholecystectomy performed elsewhere. The first was a 71-years-old man who presented one month later with abdominal discomfort and distention due to diffuse bile peritonitis. After laparotomy, a defect 1 cm in length of the common bile duct was found; because of septic condition and local inflammation an external drainage of the bile duct was established. The patient died in the I.C.U. some hours later from massive pulmonary embolism. The second case was a 66-years-old man, who presented 11 days later with fever, abdominal complains and a considerable fall of the

hematocrit. After laparotomy, intraabdominal blood retention with sub-hepatic and pelvic abscess formation was revealed; meticulous irrigation and drainage of the peritoneal cavity was performed. The postoperative course was uneventful.

Patient and hospital demographics may thus affect the outcome of laparoscopic cholecystectomy ([17]). Some well defined risk factors for converting a laparoscopic to open cholecystectomy have been described ([29]). The conversion rate is also affected by the learning curve of the surgeon and the number of cases presented with inflammation.

In conclusion, laparoscopic cholecystectomy has very low mortality and acceptable morbitity, but some well-defined major complications may occur. The surgeon must be alert and not hesitate for conversion to open procedure in every doubt.

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