A New Modified Layout for Laparoscopic Cholecystectomy

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ABSTRACT

Objective: The aim of this study is to present an economic and convenient modification of the layout for laparoscopic cholecystectomy, utilizing a three-port technique.

Methods: The surgeon stands on the left side of the patient, while the assistant stands between the patient's legs. The scrub nurse stands on the right side of the patient facing the surgeon. The assistant also operates the camera. Only three ports are used. This technique was used in 119 consecutive patients over a 24-month period. Endoscopic retrograde chlolangiopancreotography (ERCP) was done preoperatively in patients suspected to have choledocholithiasis.

Results: Sixteen patients had ERCP done preoperatively and in 12 of them sphincterotomy and stone removal was carried out. Laparoscopic cholecystectomy was successfully completed in 115 patients. The mean operative time was 35 minutes. Four cases were converted (3.6%), one due to bile duct injury, two others due to extensive adhesions, and a fourth due to cholecystoduodenal fistula. The total morbidity rate was 4.2%. The mean hospital stay was 1.8 days.

Conclusions: Laparoscopic cholecystectomy can be safely and conveniently done using only three ports in the modified position described. You need only one assistant, only one monitor and one less trocar. There is no prolongation of the operative time and the results are comparable to the classic four-trocar technique.

Key Words: Laparoscopic cholecystectomy, Layout, Modified.

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INTRODUCTION

Laparoscopic cholecystectomy was first performed by Mouret in Lyon, France, in March, 1987.[1] Since then it gained wide acceptance among surgeons and is now considered the standard treatment of cholecystolithiasis.[2,3] The technique and advantages of the procedure are well documented.[4-6] It classically utilizes four (or five) ports. The position of the patient and the arrangement of the operating team and the position of the ports and instruments vary in the American and European techniques.[5] In this study we present our experience with a modified convenient and economic layout for patients undergoing laparoscopic cholecystectomy using three ports only.

PATIENTS AND METHODS

A total of 119 patients with gallbladder stones were offered laparoscopic cholecystectomy by one surgical team, over a period of 24 months (April, 1994, through March, 1996). All patients had symptomatic gallstone disease. Endoscopic retrograde cholangiopancreotography (ERCP) and sphincterotomy was performed preoperatively in patients suspected to have common bile duct stones based upon their laboratory and ultrasonographic findings.

Operating Room Set-up (Figure 1):

The surgeon stands on the left side of the patient, as in the American technique. The assistant also operates the camera and stands between the legs of the patient. The scrub nurse stands on the right side of the patient facing the surgeon. There is no need for a second assistant and no need for a second monitor. We used only three trocars inserted as shown in **Figure 2**. The scope is passed through the umbilical port. The working port is just below the xiphoid process. A third port is inserted in the anterior axillary line some 5-7 centimeters below the costal cartilage. The assistant holds both the camera and the right sided port. The assistant may modify the point where the gallbladder is grasped as the procedure progresses. If the gallbladder is unusually long the fundus can be stitched to the undersurface of the diaphragm. Operative cholangiography is not done routinely and where stones in the common bile duct are suspected an endoscopic retrograde cholangiopancreotography and sphincterotomy is performed prior to gallbladder removal.

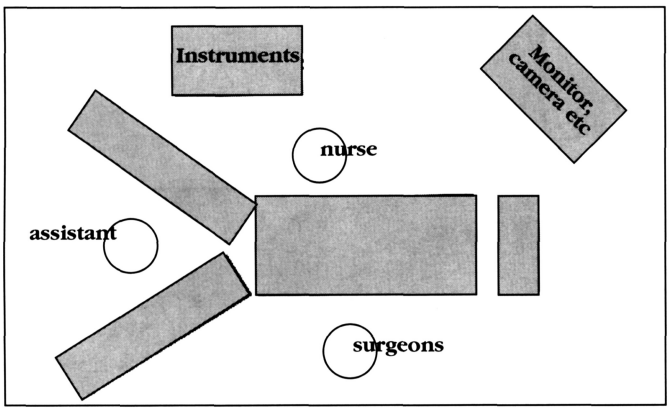

Figure 1. The modified layout

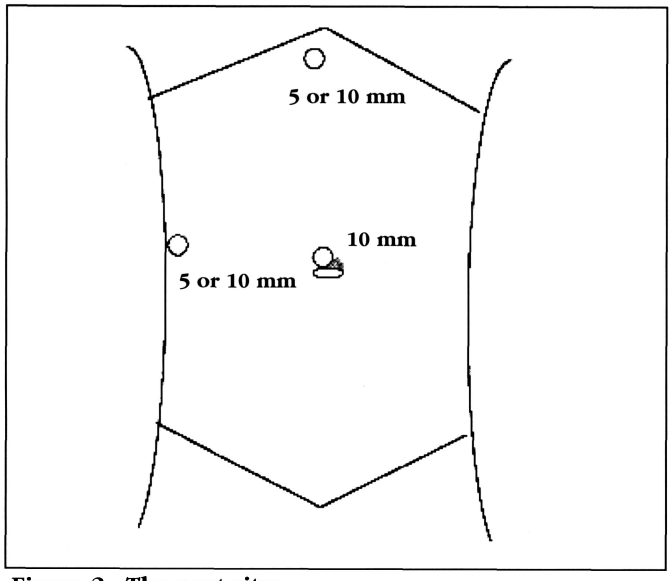

Figure 2. The port sites

RESULTS

The study involved 119 patients, 91 females and 28 males. Their age ranged from 20 to 80 years (mean 39.5 years). All patients had ultrasonographic proof of the presence of gallstones. Sixteen patients with suspected common bile duct stones had endoscopic retrograde cholangiography done before attempting gallbladder removal. Endoscopic sphincterotomy and stone removal was accomplished in 12 patients. In four patients the common bile duct was free of stones. Successful laparoscopic cholecystectomy was possible in 115 patients (96.7 %). One patient required insertion of a fourth trocar to control bleeding from the cystic artery. Two patients, who had long and redundant gallbladders, needed suture of the fundus of the gallbladder to the undersurface of the diaphragm. Four patients (3.3%) required conversion to an open laparotomy and conventional cholecystectomy was performed via a right subcostal incision. In two patients acute inflammation of the gallbladder coupled with dense adhesions of the edematous gallbladder which hindered accurate identification of the cystic duct necessitated conversion to open laparotomy. A third patient had a cholecystoduodenal fistula. The fourth patient, who presented with acute cholecystitis, suffered a bile duct injury in the form of partial avulsion of the cystic duct at its junction with the common bile duct. This injury was detected intraoperatively and managed by repair of the common bile duct around a T-tube.

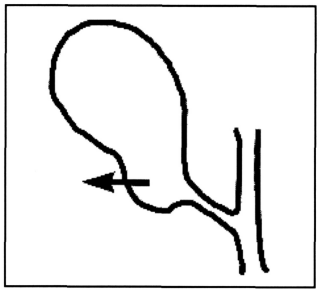

Figure 3. Direction of traction is mainly lateral not cephalic.

The mean operative time for the laparoscopic procedure, measured from skin incision to skin closure, was 35.7 minutes (range 17 to 85 minutes). The hospital stay ranged from one to nine days (mean 1.8 days). The patient who suffered a bile duct injury remained in the hospital for nine days. Two patients had prolonged bile leakage following cholecystectomy and were managed conservatively. Patients were followed up for a mean period of 14 months (range 2 to 29 months). One patient presented with trocar site hernia 5 months after the procedure and did not elect to undergo repair. The morbidity rate was 4.2% (5/119) and all complications were minor except for the patient who suffered bile duct injury **(Table 1)**. This patient was the second in the series. There was no mortality and no re-operation in this series.

DISCUSSION

Laparoscopic cholecystectomy has rapidly replaced open cholecystectomy as the standard treatment of gallstone disease. This change to a laparoscopic access is attributed to its obvious advantages, including less postoperative pain, a better cosmetic result, a shorter hospital stay, and an early return to normal activities. These benefits result in a reduced overall cost.[7,8] A recent report adds a reduced complication rate to the list of advantages.[9]

Table 1.
Perioperative and postoperative complications

Type	Number	%
Bile duct injury	**1**	**0.8**
Prolonged biliary drainage	**2**	**1.7**
Minor wound sepsis	**1**	**0.8**
Trocar site hernia	**1**	**0.8**

Laparoscopic cholecystectomy on the other hand utilizes expensive technologically advanced equipment, including costly disposable instruments. It requires more personnel than are required for open operations. In the American technique, which is more commonly adopted, the surgeon and the camera operator stand on the left side of the patient while the assistant and the nurse stand on the right side of the patient. Two monitors are usually used. In the European technique the surgeon stands between the patient's legs with the first and second assistants on the left and right sides of the patient respectively.

In our modified layout the personnel needed are reduced. All members of the surgical team have good access to the video monitor. The surgeon has more space and he can work either single-handed, giving the right lateral port to his assistant-camera operator, or use both hands, manipulating the gallbladder himself. The lesser number of trocars inside the abdomen prevents so-called "sword fighting." The omission of the midclavicular port and the use of the anterior axillary port instead may improve the safety of the procedure. The same port can be used for superior traction to aid in dissection of the gallbladder from its bed. The surgeon can modify the point where the forceps holds the gallbladder according to operative circumstances. The direction of cephalic traction exerted by the midclavicular port distorts the anatomy and alters the position of the common hepatic duct to simulate the cystic duct, hence making it more vulnerable to injury. The use of our three-port technique avoids this problem. The single anterior axillary port we recommend permits traction on Hartmann's pouch in a lateral direction resulting in excellent exposure of the Calot's triangle **(Figure 3)**. This is the same direction of traction used in open cholecystectomy. Most surgeons will exhaust themselves to detect the junction of the cystic duct to the common hepatic duct. This type of dissection increases the possibility of bile duct injury. The detection of the junction of the cystic duct to the infundibulum of the gallbladder is more important to help reduce the incidence of such injury.

We used the modified technique in both chronic and acutely inflamed gallbladders and found that it can be easily used in both settings. The only occasion we needed a fourth port was when there was unusual bleeding from the cystic artery.

The technique we adopted builds on the advantages of the laparoscopic approach and adds to them. The results of this series compare favorably to results of studies done using the "classical" technique.[10-12] The operative time is not prolonged, the morbidity rate is low. One less trocar is needed which means one less scar to the patient. There is no need for a second assistant, and no need for a second monitor.

CONCLUSION

Laparoscopic cholecystectomy can be safely performed using only three trocars in the modified position described. The layout is more convenient to the surgical team, more economic to the patient and to the hospital. The patient enjoys one less scar.

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