CurrentTechniques™

in

LAPAROSCOPIC CHOLECYSTECTOMY

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(NOT LAPAROSCOPIC CHOLANGIOGRAM, CHOLEDOCHOSCOPY, OR REMOVAL OF COMMON BILE DUCT STONES)

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NEW TO CurrentTechniques?

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1 LAPAROSCOPIC SURGERY

Laparoscopic cholecystectomy is an excellent example of the successful application of new technology to an old operation.

Advantages

Reductions in:

- pain
- morbidity
- mortality
- length of hospital stay
- time off work

Disadvantages

More electronic equipment.

More surgical skills.

- Orientation in 2 dimensions rather than 3.
- Remote view via a TV monitor.
- Accommodate loss of touch.
- Accommodate loss of some colour contrast.

Restraints on the ease of cannulating, and exploring the bile ducts.

Incompletely developed new surgical instruments and materials.

Unfamiliarity with equipment and materials.

Lack of detailed information about the use of equipment and materials.

Risk of damage to bowel and large blood vessels.

More bile duct damage compared with the open operation.

More expensive.

*** Most of the disadvantages can be overcome by adequate information and safe surgical techniques.

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Principles

Use the surgical principles already established for open cholecystectomy.

Add the benefits of laparoscopic techniques to them.

Do not discard an established principle just to suit a limitation of laparoscopic surgery.

Use a simulator to get used to the feel of laparoscopic techniques and equipment .

Learn how to check, use and correct the new equipment both on and off the table. When something won't work, everyone will look to the surgeon for the solution!

Convert to an open operation without hesitation. A big scar is better than a big lawsuit.

Use RFI - meaning "Read the Instructions"

2 ANATOMY

INTRODUCTION
ABDOMINAL WALL AND CAVITY
Umbilicus
Epigastrium
Right side of the abdomen
GALLBLADDER
CYSTIC ARTERY
BILE DUCTS

INTRODUCTION

For safe surgery, you need to know about:

The normal anatomy.

Distortion of anatomy by forceps and the patient's position.

Variants such as a short cystic duct.

Extras such as accessory vessels.

ABDOMINAL WALL AND CAVITY

Umbilicus
Epigastrium
Right side of the abdomen

Umbilicus

Gives the cameraman a good view of:
the gallbladder.
bile ducts.
the rest of the abdomen and pelvis.

Is relatively avascular
We use the inferior margin of the umbilicus to avoid the umbilical vein and the 2 umbilical arteries, which may not, in fact, be obliterated.
.
Its creases hide the laparoscopy scar.

It is relatively far from adhesions following:
cholecystitis.
appendicitis.
pelvic inflammatory conditions.

It is the furthest part of the abdominal wall from:
major structures, when the abdomen is held out for the insertion of the Veress needle.

the abdominal contents, when the abdomen is distended with CO2.

When the abdomen is not under traction, or not infllated:
the umbilicus may lie as little as 5cm. in front of:
the bifurcation of the aorta.
the inferior vena cava.
the iliac arteries and veins.

with intervening:
omentum.
small bowel.
large bowel.
a distended bladder.

A very deep or discharging umbilicus may be connected via the vitello-intestinal duct to the ileum. Probing such an umbilicus will confirm this.

Epigastrium

The epigastric port gives good access for:
dissection of the:
gallbladder.
cystic duct.
cystic artery.

removal of the gallbladder.

avoiding clashes with the laparoscope in the umbilicus.

The epigastric port should be:
on the right side of the falciform ligament,
2cm. lateral to the midline.
at the level of the liver edge,

2cm. below the costal margin.

avoiding the right superior epigastric vessels, seen on transilluminating the abdominal wall with the laparoscope.

Right side of the abdomen

The right side of the abdomen gives good access for:

the subcostal port for:

retraction of adhesions and Hartmann's pouch,

5cm. lateral to and 5cm. below the epigastric port.

the iliac port for:

retraction and elevation of the gallbladder,

5cm. above the iliac crest and in line with the epigastric and subcostal ports.

GALLBLADDER

Normal

The normal gallbladder has:

a fundus.
a body.
a Hartmann's pouch.
a neck.

Distortion

Retraction on the fundus and Hartmann's pouch deliberately raises the fundus vertically, and pulls the pouch out to the right.

Intrahepatic

An intrahepatic gallbladder is partly or completely buried in the liver.

On a mesentery

A gallbladder on a mesentery is prone to torsion, but is usually easier to dissect and remove than normal.

CYSTIC ARTERY

Normal

The cystic artery is single.
It arises from the right hepatic artery.
It runs behind the common bile duct.
It runs parallel to, and 2mm. above the cystic duct.
It branches to supply the gallbladder.
It is 1 to 2mm. in diameter.
It is very fragile.

Distortion

Retraction on the gallbladder often pulls a loop of right hepatic artery into view.

Variants

It may be absent.
It may arise from a prominent arch of right hepatic artery.
It may branch early.
It may run below the cystic duct.
It may run just below the right hepatic duct.
It may run from the right hepatic artery in front of the common bile duct.
It may arise from:

- The left hepatic artery.
- The superior mesenteric artery.

Accessory

There may be accessory cystic arteries running from:

- A double right hepatic artery.
- The left hepatic artery.
- The superior mesenteric artery.
- The gallbladder bed.

BILE DUCTS

Normal

The right and left hepatic ducts join to form the common hepatic duct.

The common hepatic duct is joined by the cystic duct to become the common bile duct.

The common bile duct runs downwards and behind the duodenum.

The common bile duct opens into the duodenum as it joins with the pancreatic duct at the ampulla if Vater.

Distortion

Traction on the gallbladder often causes:

Tenting of the common bile duct.

Sideways shifting of the common bile duct to mimic the cystic duct.

Variants of the Cystic Duct

Origin from the right hepatic duct.
High junction with the common bile duct.
Low junction with the common bile duct.
Wide cystic duct.
Short or zero cystic duct.
Cystic duct winding around the common bile duct.

Accessory Cystic Ducts

From the gallbladder bed.

Non specific Structures adjoining the Cystic Duct

Peritoneum.
Strands of fat.
Strands of adventitia.
Strands of fibrous tissue.
Minor blood vessels.
Lymphatic vessels.
Nerve fibres.
Cystic lymph nodes.

3 PATHOLOGY

INTRODUCTION

BILIARY COLIC
ACUTE CHOLECYSTITIS
- **COMPLICATIONS**
  - **EMPYEMA**
  - **MUCOCELE**
  - **PERFORATION**
  - **SIMPLE SURROUNDING INFLAMMATION**
  - **LOCALISED PERFORATION**
  - **FISTULA**

CHRONIC CHOLECYSTITIS
BILIARY PERITONITIS
SUBPHRENIC ABSCESS
BILE DUCT STRICTURE
ADHESIONS

INTRODUCTION

The following account applies to primary gallstones forming in the gallbladder.

It does not include consideration of primary bile duct stones.

The pathological pictures depicted here are often blurred or overlap in reality. But division of the pathological processes into clear groups should enable the trainees surgeon to make useful predictions of what he may encounter in the abdomen.

BILIARY COLIC

We postulate that a stone:

moves out of the gallbladder.
passes down the cystic duct and common bile duct.

This causes a severe colicky upper abdominal pain with vomiting. The pain is is attributed to rapid distension of the gallbladder and cystic and common bile ducts.

Over 6 to 12 hours, the stone passes out of the biliary tree, with relief of symptoms.

If the stone does not pass, the sequence of events is as for acute cholecystitis.

ACUTE CHOLECYSTITIS

A stone becomes lodged in the neck of the gallbladder or Hartmann's pouch.

There is distension of the galladder due to obstruction
+ a superadded inflammatory oedema,
triggered by a chemical irritation
+ the growth of organisms (usually bowel organisms).

There is an inflammatory oedema of the wall of the gallbladder and surrounding tissues extending into the cystic duct, and bile duct.

In an uncomplicated case:
the stone is thought to fall back into the gallbladder

the gallbladder fluid escapes down the biliary tree into the duodenum.

the inflammatory process resolves.

The pain and fever usually settle down in 10 days or so.

The inflammatory process may a take a month or two to resolve sufficiently for the tissue planes to be restored.

Sometimes no stones are found at operation. They may have passed, or the condition may be caused by a stricture in the cystic duct.

COMPLICATIONS

PERFORATION
A very severe inflammation, with distension and infection, may lead to perforation of the gallbladder within 48 hours or so of the onset.

There will be widespread contamination of the peritoneal cavity.

Perforation usually requires an emergency open cholecystectomy.

LOCALISED PERFORATION
Before the gallbladder has time to perforate:
the surrounding structures will become inflamed and will adhere to the gallbladder.
These include:
omentum.
duodenum.
small and large bowel.
anterior abdominal wall.
liver.

This has the effect of confining a leakage of gallbladder contents to just around the gallbladder itself.

Healing by fibrosis may make the tissues very tough to dissect.

The tissue planes are likely to be obliterated.

The patient is likely to have been unwell for 2 to 4 weeks with a localised perforation.

Adhesions are likely to be very dense and be permanent.

SIMPLE SURROUNDING INFLAMMATION

Simple inflammatory oedema with adherence of tissues involves:

- omentum.
- duodenum.
- small and large bowel.
- anterior abdominal wall.
- liver.

In theory, the inflammatory change should completely subside.

In perhaps 50% of cases it does, taking 1 or 2 months.

In the rest, there is healing with varying degrees of fibrosis.

- Filmy adhesions.
- Dense adhesions.
    - eg Hartmann's pouch adhering to the common bile duct.

Tissue planes may not be completely restored.

Recurrent bouts of acute cholecystitis will lead to progressively less restoration of the tissues to normality.

EMPYEMA

An empyema of the gallbladder is an exaggeration of an acute cholecystitis with the emphasis on infection.
There may be systemic effects such as rigors and fevers.

The gallbladder is not perforated, but if surrounding tissues are adherent, it may be impossible to distinguish an empyema from a localised abscess.

The ideal treatment, if the condition does not settle with conservative measures is an urgent open cholecystectomy.

MUCOCELE
This is an end stage to acute cholecystitis:
the gallbladder has not drained,
but the infection has subsided,
perhaps under the influence of antibiotics.

There may not be very severe adhesions.

A trial of laparoscopic cholecyctectomy is worth considering.

FISTULA
Here, the wall of the gallbladder necroses, together with any adherent viscus, leading to a fistula.

The fistula runs most commonly into the duodenum, but it may open into the colon or small bowel.

It is a contraindication to a laparoscopic cholecystectomy.

Suspect a fistula whenever dissecting through dense adhesions around a gallbladder.

CHRONIC CHOLECYSTITIS
Chronic cholecystitis may well be the late result of bouts of acute cholecystitis.

Sometimes the condition seems to form around gallstones in a more insidious way.

There is dense fibrosis of the gallbladder which may involve the cystic duct area.

The tissues may be shrunken and distorted, with obliterated tissue planes.

Chronic cholecystitis tends to occur in older patients.

STONES IN THE BILE DUCTS
We are assuming that stones have been excluded from the common bile duct and the hepatic ducts by a combination of :
ultrasound, showing a normal common bile duct.

a normal serum bilirubin,

or have had stones removed by ERCP.

Stones in the gallbladder range from biliary sludge and gravel, to 10cm. or more in diameter.

The larger stones tend to be:

- solitary or less than 5.
- too large to pass down the cystic duct.
- associated with fistulae.
- associated with chronic cholecystitis.

The smaller stones tend to be:

- more than 5 in number.
- able to pass into the cystic duct.
- associated with biliary colic.

BILIARY PERITONITIS

Despite its name, leakage of bile from the liver, from accessory bile ducts, or from the main bile ducts does not provoke an intense inflammatory reaction with pain and tenderness. This is in contrast to the leakage of " activated" bile from a perforated duodenum for instance.

A collection of unactivated bile may simply present as some abdominal distension or loss of appetite 3 or 4 days after a laparoscopic cholecystectomy. It is easy to confirm with an ultrasound scan.

SUBPHRENIC ABSCESS

A subphrenic abscess following a laparoscopic cholecystectomy is likely to have started with a collection of blood and infected bile. It may form above or below the liver. It usually takes a week or more to develop into a defined abscess. Its presentation, as ever, is often suggested by a general malaise, loss of appetite, and a low grade fever.

Sensible precautions incude:

- Systemic prophylactic antibiotics.
- Peritoneal irrigation with a solution containing tetracycline.
- Thorough removal of peritoneal blood and bile.
- Close examination for any bile oozing from the gallbladder bed.
- Insertion of a suction drain.

BILE DUCT STRICTURE

This is a rare but very serious hazard of gallbladder surgery, more common after laparoscopic than open surgery. Laparoscopic surgery definitely has a lower mortality than open methods, but that is little consolation to a patient surviving with a bile duct stricture.

Only about half of the damaged bile ducts are recognised at the time of the original operation. The damage is caused by a combination of:

Loss of tissue planes with acute inflammation.
Dissection into distorted or aberrant anatomy.
Damage to tissues by hot diathermy dissection.
Clipping of bile ducts in error or by accident.

Factors raising the risk of bile duct damage include:

Acute cholecystectomy.
Unclear anatomy.
Difficult cholecystectomy.
Inexperience.

Stricture categories:

Class I Minor defect following minimal tenting.
Class II Clipping of the bile duct.
Class III Complete transection of the bile duct.
IIIa Without tissue loss.
IIIb With tissue loss.
Class IV Defect in the right or left hepatic ducts.

ABDOMINAL ADHESIONS

Adhesions in the rest of the abdomen are hazardous because of:

obscuring the view.
containing viscera such as small and large bowel.
connecting with the very vascular omentum.

Adhesions form on:

the back of abdominal incisions.
laparoscopic incisions.
at the site of previous surgery.
in irradiated areas.
at the site of previous intraperitoneal infections.

Filmy dark blue adhesions will free off with blunt dissection without bleeding.

Dense white adhesions will bleed least if they are freed by coagulation dissection at their junction with the peritoneum

4 INVENTORY
5 OFF TABLE EQUIPMENT
6 OPERATION

7 VIDEOS
8 QUIZZES

What do you see in the diagram?
What would you do next?
Look what you have done
See the mistakes
See the abnormalities
See the problems
Simulate the problems

QUIZ 1

1.1 In the diagram, where would you expect to find:
The falciform ligament?
The gallbladder?
The bifurcation of the aorta?

1.2 From what you can see in the diagram, would you expect to find:
A zero cystic duct?
A tented cystic duct?
A stone in the cystic duct?
Any of the above?

1.3 Where are the most likely positions of:
The right hepatic artery?
The cystic artery?
The right hepatic duct?

1.4 How long would you ideally wait after acute cholecystitis, before performing a laparoscopic cholecystectomy?
3 days.
No, this would probably be the most dangerous time, because of inflammatory adhesions.
3 weeks
No, the inflammatory process would still make the operation unnecessarily dangerous.
3 months.
Correct. But even this long after the cholecystitis, there may be residual inflammation and adhesions.

1.5 Which structure is most likely to adhere to Hartmann's pouch?
Omentum.
Correct.
The quadrate lobe of the liver.

No. The quadrate lobe is usually too far away to reach Hartmann's pouch.

The transverse colon.

No. This is quite rare, but should always be in the back of your mind if the omentum is very densely adherent.

1.6 The cystic duct runs:

Obliquely towards the bile duct.

No. In a laparoscopic cholecystectomy, it will runs horizontally due to lateral traction on Hartmann's pouch. An oblique path suggests that it could be the common bile duct itself.

Into the left hepatic duct.

No. It may very rarely run into the right hepatic duct.

Parallel to the cystic artery.

Yes. This is the commonest anatomical arrangement, but other abnormalities of the artery and duct are very common.

1.7 Bile duct damage:

Is usually detected during the course of the laparoscopic cholecystectomy.

No. The surgeon is not aware of damaging the bile duct in about half the cases of injury.

Is a fixed risk of laparoscopic cholecystectomy.

No. The risk reduces with surgical experience and with correct training.

Is the major long term complication of laparoscopic cholecystectomy.

Correct.

1.8 Conversion is often necessary for:

Bile leakage from the gallbladder?

No. This is not a dangerous complication, and can be controlled quite easily.

For an "easy" gallbladder.

No. But you must be aware of the dangers of tenting the common bile duct in such cases.

For unclear anatomy.

Correct. This is a major indication to make the safe decision and convert to an open operation.

For bleeding from the gallbladder bed.

No. Correct handling of the minor bleeding vessels here usually makes conversion unnecessary.

QUIZZ 2

2.1 A cloudy view is NOT cause by:
Wrong focus.
No. This is a common cause of a cloudy view.
Condensation inside the camera.
No. This is a common cause of a cloudy view.
Liquid on the eyepiece of the camera.
No. This is a common cause of a cloudy view.
Kinked camera lead.
Correct. This is very rare and would produce a complete loss of the picture.

2.2 The best insufflation pressure for the peritoneum is:
5 mm. mercury.
No. This would not raise the abdominal wall enough. 12 mm. is needed
12 mm. mercury.
Correct.
18 mm. mercury.
No. This pressure is too high. It would start to interfere with the venous return to the heart. 12 mm. is an ideal level.
22 mm. mercury.
No. This pressure is too high. It would interfere with the venous return to the heart. 12 mm. is an ideal level.

2.3 If the diathermy alarm sounds when the power is switched on:
There is interference from the ECG.
No. The ECG will not cause this. The diathermy pad is at fault here.
The diathermy lead is plugged into the wrong socket.
No. The alarm does not sound, but the diathermy does not work. The diathermy pad is at fault here.
There is a poor contact between the diathermy pad and the diathermy lead.
Correct. The lead may be inserted upside down.

2.4 No picture on the TV monitor means:
Monitor power not switched on.
Correct.
Video system not switched on.
No. The monitor power is not switched on here.
Camera lead not plugged in.
No. The monitor power is not switched on here.

2.5 No light from the light source means:
Damp light lead.
No. The light lead is waterproof. There is a bulb failure here.
Bulb failure.
Correct.
Brightness dial turned down too low.
No. Even at its lowest, there is some light. There is a bulb failure here.

2.6 To apply an Endoloop, you need:
To tie a knot in the catgut.
No. The knot is already tied.
An Endoloop introducing tube.
Correct. This allows you to push the loop into the peritoneal cavity.
An Endoloop forceps.
No. No forceps are needed.

2.7 Line up the monitor with the surgeon and the gallbladder:
To optimise orientation.
Correct. You will see the difficulties of orientation when examining the pelvis during a laparoscopic cholecystectomy.
To prevent the second assistant obscuring the view of the monitor.
No. It is to optimise the surgeon's orientation.
To get a better view of the cystic duct.
No. It is to optimise the surgeon's orientation.

2.8 Clips have the following features.
Rarely slip off the cystic artery.
No. The clips are surprisingly easy to dislodge from the cystic artery (and from the cystic duct as well).
Can be reused.
No. This is not safe, particularly if they have been bent.
May damage the right hepatic duct.
Yes. This can easily happen if other tissue is included with the cystic artery during clipping.

QUIZZ 3

3.1 Where is the video camera?
In the equipment tower.

No. It is the piece of equipment held by the cameraman, plugged into the back of the laparoscope.
It is the equipment held by the cameraman in the back of the laparoscope.
Correct.
It is the lens of the laparoscope.
No. In the Wolf system, it is at the opposite end of the laparoscope.

3.2 What adjustment is needed to TV monitor A, if you are planning to run TV monitor B as well?
On the back of monitor A, 75 ohm switch ON.
No. This switch should be off, because the monitor B provides equivalent resistance.
On the back of monitor A, 75 ohm switch OFF.
Correct. Monitor B provides 75 ohms of resistance.
On the back of monitor A, remove connecting lead from out socket on line A 75 ohms.
No. Switch 75 ohm switch ON.

3.3 When is the CO2 tank on the insufflator full?
When the CO2 volume dial reads Zero.
Correct!
When the CO2 volume dial reads 3 litres.
No. For some reason, the dial reads Zero when the tank is full.
When the main CO2 bottle is 50% full.
No. It is full when the CO2 volume dial reads Zero.

3.4 What level of diathermy is safe for endoscopic dissection?
Coagulation level.
Correct. A higher level may cause unexpected damage.
Blend level.
No. A level higher than coagulation may cause unexpected damage.
Cutting level.
No. A level higher than coagulation may cause unexpected damage.

3.5 What level of suction will prevent tissues adhering to the sucker end?
0.2 bars (150 mm. mercury).
Yes.
0.4 bars (300 mm. mercury).
No.This is a bit violent. 0.2 bars is better.

0.6 bars (450 mm. mercury).
No. This is very violent suction. 0.2 bars is better.

3.6 Where should the irrigation solution container be placed?
At the left hand side of the surgeon.
No. Unless the surgeon is left handed.
Next to the monitor.
No. It is much more convenient at the surgeon's dominant side.
At the right hand side of the surgeon.
Yes, for a right handed surgeon.

3.7 How available should open cholecystectomy equipment be?
Already laid out on an instrument trolley?
No. This will be wasteful, since there will be ample time to open sterile packs if a conversion is needed. Immediately accessible packs of vascular instruments should be present.

Available instantly in sterile packs.
Yes. Immediately accessible packs of vascular instruments should be also be present.
Available somewhere in the operating department.
This is a recipe for problems. The equipment should be immediately available in sterile packs. Immediately accessible packs of vascular instruments should also be present.

3.8 What is an ideal staffing level around the table?
Surgeon and scrub nurse.
No. This is sometimes done, with the scrub nurse acting as cameraman. Any complications to the operation requires more staff.
Surgeon, cameraman and scrub nurse.
Yes, this is an efficient level outside a teaching centre.
Surgeon, cameraman, second assistant and scrub nurse.
This is excessive, unless there is a teaching committment.

QUIZZ 4

4.1 How much pressure is needed in the irrigation system?
Irrigation container 50cm. above the patient.
No. This will give too slow a flow to wash the operating field quickly.
Irrigation container 100cm. above the patient.
Yes. This will give a satisfactory washing effect.

Forced irrigation using a cuffed pressure system.
This is popular with some surgeons, but is not essential.

4.2 What causes an absence of coagulation on pressing the pedal after the usual checks?
Faulty diathermy pad connection.
No. This would cause the alarm to sound. The diathermy lead is plugged into the wrong site on the control panel.
No power supply from the wall.
No. This would show up on the usual checks. The diathermy lead is plugged into the wrong site on the control panel.
Diathermy lead plugged into the wrong site on the diathermy control panel.
Yes. Also the blue plug on the control panel may also still be in place.

4.3 What may prevent the laparoscope fitting into the camera socket?
One of the 2 spokes on the perimeter of the camera casing may need unscrewing.
Correct.
Lack of lubrication of the laparoscope.
No. The camera does not need any lubrication. One of the 2 spokes on the perimeter of the camera casing may need unscrewing.
Tight camera lead.
No. This is entirely separate. One of the 2 spokes on the perimeter of the camera casing may need unscrewing.

4.4 How much free loop of light lead is needed for the cameraman's movements?
25 cm.
No. This is too short. The cameraman needs 50 cm.
50 cm.
Correct.
75 cm.
The cameraman wil only need 50 cm. 75 cm. is probably more than he can get.

4.5 How many leads run into the laparoscope camera?
1.
No. There are three. The light source. The camera lead. The CO2 supply.
2.

No. There are three. The light source. The camera lead. The CO2 supply.

3.

Correct. There are three. The light source. The camera lead. The CO2 supply.

4.6 If the monitor picture is not clear, who ends up solving the problem(s)?

The surgeon.

Correct. It is in his interests to know all the possible causes and their solutions.

The cameraman.

No. He has only very limited means to solve the problem(s). The surgeon is primarily responsible.

The operating department assistant.

No. He has limited means to solve the problem(s), which are mainly on-table.

4.7 Which is the correct order for increasing the CO2 flow?

1 litre/min., 4 litres/min.,4 litres/min. automatic.

Yes.

Switch straight to 4 litres/min. automatic.

No. This will not work. It has to be 1 litre/min., 4 litres/min.,4 litres/min. automatic.

1 litre/min. to 4 litres/min. automatic.

No.This will not work. It has to be 1 litre/min., 4 litres/min.,4 litres/min. automatic.

4.8 Why is it sensible to have a radio-lucent operating table?

To do a laparoscopic cholangiogram.

Maybe. However it is probably more sensible to remove stones from the common bile duct by ERCP before or after the laparoscopic cholecystectomy. A laparoscopic cholecystectomy is not a proven way of determining the anatomy in a difficult case.

In case a conversion to an open operation leads to the need for a cholangiogram.

Yes. This is a reasonable, if unusual, sequence of events.

To trace dislodged clips.

No. These clips do not need to be retrieved.

QUIZZ 5

5.1 Which statement is correct about a Verress needle?

The needle runs inside the sheath.

No. There is no sheath. The probe slides back inside the hollow needle.

The probe springs forward inside the needle.

Correct.The idea is that the probe will protect the tissues from the needle.

The needle slides back around the probe.

No. The needle cannot slide. The probe is the part that does the sliding.

5.2 Which statement is incorrect about Verress needle insertion?

The needle pops through the skin.

This is the incorrect statement. The skin must be incised so that the needle is not gripped by the skin.

If the needle is gripped at skin level, it is very difficult to feel whether the needle tip is passing through the deeper tissues safely.

The needle pops through the linea alba

This as a correct statement.

The incorrect statement concerns the skin. The skin must be incised so that the needle is not gripped by the skin.

If the needle is gripped at skin level, it is very difficult to feel whether the needle tip is passing through the deeper tissues safely.

The needle pops through the peritoneum.

This is a correct statement.

The incorrect statement concerns the skin. The skin must be incised so that the needle is not gripped by the skin.

If the needle is gripped at skin level, it is very difficult to feel whether the needle tip is passing through the deeper tissues safely.

5.3 When inserting the Verress needle, point it towards:

The xiphisternum.

No. This may damage the aorta.

The coccyx.

Yes.

The left.

No. Keep to the midline.

5.4 If there is obstructed flow on the insufflator flow meter:

The insufflator pressure will be low.

No. The insufflator pressure will be high.

The ports may be leaking.
No. Leaking ports will increase the flow.
The needle may be covered by a flap of omentum.
Correct. This is one of the many causes of obstructed flow.

5.5 If there is no resonance in the abdomen on insufflating CO2:
Check for CO2 leaks, lack of flow or obstruction.
Correct.
Resite the needle.
No. First of all check for CO2 leaks, lack of flow, or obstruction.
Increase the insufflation pressure.
No. This is dangerous if you are insufflating the omentum, or wrong if there is a leak in the system. Check for CO2 leaks, lack of flow or obstruction.

5.6 Remove the Verress needle when:
I litre of CO2 is insufflated.
No. You will need to insufflate at least 2 litres, but use pressure and distension as end points rather than volume.
When flow stops.
No. This will be misleading if there is a leak, CO2 failure or an obstruction.
When the abdomen is distended and resonant.
Yes. Back up these features with the pressure and flow.

5.7 If blood flows up the Verress needle:
Convert immediately.
No. This is not needed unless the patient collapses. Resite the needle and look for the cause of the bleeding.
Resite the needle and look for the cause of bleeding.
Correct.
Increase the insufflation pressure.
No. This may damage the tissues which are bleeding. Resite the needle and look for the cause of bleeding.

5.8 If the patient develops a severe bradycardia:
Suspect a reaction to CO2 and deflate the abdomen.
Yes. This is probably more common than a myocardial infarct.
Convert to an open operation.
No. The cause of the bradycardia is probably not connected with intraabdominal damage. A conversion would make it worse.
Suspect a reaction to CO2 and deflate the abdomen.

Tilt the patient more foot down.
No. This would probably make things worse. Suspect a reaction to CO_2 and deflate the abdomen.

QUIZZ 6

6.1 Camera rotation is correct if:
The gallbladder is vertical.
Not necessarily. The gallbladder will not be vertical if it is not being elevated. The cameraman should refer to a better indicator, such as a vertical Wolf logo on the camera.
Fluid levels are horizontal.
Yes. Remember this point.
The arrow on the perimeter of the monitor is at 12 o'clock.
Not necessarily. If the light lead is allowed to rotate horizontally on the camera to improve access, the arrow will be at 8 o'clock. The cameraman should refer to a better indicator, such as the Wolf logo on the camera being vertical.

6.2 If the picture is not clear, what can you do to help?
Shake the camera.
No. This will not clear the picture and will disorientate the surgeon.
Clean the lens.
Do not do this without asking the surgeon first.
Touch the omentum.
Yes. This is a quick way of clearing haziness due to condensation.

6.3 Which movement of the camera is best?
Slow and continuous.
No. If possible, a non-moving field is best.
Rapid and accurate.
No. Rapid movements are very disorientating. Keep still.
No movement.
Yes. This is the ideal. You can make changes by very slight adjustments of position.

6.4 Which action will NOT help to centre the camera.
Looking at the handle of the camera.
Correct. This is a beginner's mistake.
Anticipating the surgeon's moves.
No. This is one of the best ways of being a good cameraman.

The cameraman remembers he is controlling the view.
No. This is one of the best ways off being a good cameraman.

6.5 On the diagram, point to the cystic duct.

6.6 If the surgeon wants to find the end of the clip applier, should the cameraman:
Zoom out.
Correct. Often only 1 - 2 cm. movement is needed.
Zoom in.
No. The cameraman should zoom out 1 - 2 cm. to show the surgeon the tip of the clip applier.
Move the camera from side to side.
No. This is very disorientating.The cameraman should zoom out 1 - 2 cm. to show the surgeon the tip of the clip applier.

6.7 If the pneumoperitoneum is lost, what can the cameraman check?
Check the CO2 tap on the camera has not turned off.
Correct, but the cameraman should check all 3 points.
Check the umbilical port has not slipped out, causing a CO2 leak.
Correct, but the cameraman should check all 3 points.
Check the CO2 line is not kinked.
Correct, but the cameraman should check all 3 points.
Check all the above.
Correct.

6.8 If you think you cannot zoom in any further:
Push the umbilical port further in.
Yes. It often slips out a little without the cameraman noticing.
Keep still.
No. You can probably push the umbilical port further in.
Change the focus.
No. This will not help, and it will upset the view.

QUIZZ 7

7.1 Why is there such concern about adhesions following previous operations?
Danger of perforating the bowel.
Yes. Perforating other organs with the Veres needle, and particularly with the trocars is less likely, though no less serious.
Adhesions cloud the camera lens.

No. Touching adhesions with the camera lens may well clear fogginess due to condensation. The main concern is the risk of damage to bowel and other organs.

Adhesions cause disorientation.

No. This is a lesser consideration, overshadowed by the risk of damage to bowel and other organs.

7.2 Which type of adhesions can be broken down with the camera?

White adhesions.

No. Attempts to break white adhesions with the camera may lead to bleeding, bowel damage, and tearing of adherent organs.

Pink adhesions.

No. Attempts to break pink adhesions with the camera may lead to bleeding, bowel damage, and tearing of adherent organs.

Black adhesions.

Yes. These adhesions are very delicate and thin, hence the blackness showing through from the deeper parts of the peritoneal cavity. They will usually dissect away easily. If not, use diathermy or scissors.

7.3 The best place to dissect adhesions is:

At the junction of the adhesion with the peritoneum.

Correct. This is usually avascular.

At the junction of the adhesion with the bowel.

No. This risks bleeding and bowel perforation. Choose the junction between the adhesion and the peritoneum of the abdominal wall.

At the junction of the adhesion with the omentum.

No. This is usually too vascular. Choose the junction between the adhesion and the peritoneum of the abdominal wall.

7.5 On the diagram, where would you divide the adhesions?

7.6 If you expect to find adhesions under the umbilicus, which method of opening the peritoneum would NOT be safe?

Open incision of the peritoneal cavity.

No. This would be quite safe.

Introducing the Verress needle in the right upper quadrant.

No. This would be relatively safe.

Introducing the Veress needle carefully into the umbilicus.

Correct. This would not be safe. An open dissection would be better.

7.7 Should you clear adhesions completely from the abdominal wall?

No.

Correct.

Yes.

Incorrect. Only free enough to give you access to the gallbladder and cystic duct area.

Sometimes.

Not a good idea, unless the only adhesion present is obstructing your view of the gallbladder and cystic duct area.

7.8 Should you clear adhesions completely from the gallbladder?

Yes.

Correct. This is essential before dissecting the cystic duct area.

Sometimes.

No. Clearing the adhesions completely is essential.

No

Incorrect. Clearing the adhesions completely is essential.

7.9 On the diagram, where would you free off the adhesions?

QUIZZ 8

8.1 Retracting the fundus upwards will assist:

Elevation of the liver.

Correct. This gives access to Hartmann's pouch and the cystic duct.

Freeing gallbladder adhesions.

No. It is better to free adhesions before elevating the fundus.

Emptying of the gallbladder.

No. It is better not to try emptying the gallbladder contents through the cystic duct in case stones escape into the cystic duct.

8.2 Hartmann's pouch will appear:

Attached to the liver.

No. This would be most unusual.

To the right of the cystic duct.

Correct.

Near the fundus of the gallbladder.

No. The pouch is usually quite distinct from the fundus.

8.3 If Hartmann's pouch contains a 2cm. stone:

Open the pouch to remove the stone.

No. It is better to elevate the pouch with the stone inside it and find the cystic duct.

Convert to an open operation.

No. Only convert if the pouch prevents you finding the anatomy or if it is stuck to the bile duct.

Elevate the pouch with the stone inside.

Yes. This usually gives an adequate view of the cystic duct and artery area.

8.4 If you can't get a grip on Hartmann's pouch:

Elevate Hartmann's pouch with the spoons forceps (closed).

Yes. This usually succeeds.

Continue the operation with the pouch not retracted.

No. This will be unnecessarily hazardous. Elevate Hartmann's pouch with the spoons forceps (closed).

Change to a rotweiler forcep.

No. This wil need a 10mm. port, and may tear Hartmann's pouch.

8.5 If you can't dissect to see the junction between Hartmann's pouch and the cystic duct:

Convert to an open operation.

This is probably the best thing to do, particularly if the operation is getting progressively more difficult.

Continue dissecting.

This is probably very unwise. Get more experienced advice or convert.

Try dissecting more medially, where you think the common bile duct joins the cystic duct.

No. This is a recipe for disaster. Cut your losses and convert.

8.6 If there are dense adhesions to Hartmann's pouch:

Strip off the adhesions.

No. Dissection with the hook electrode is safer. Beware of bowel or a fistula.

Aspirate Hartmann's pouch.

No. This will not serve a useful purpose. Dissect the adhesions away with the hook electrode. Beware of adherent bowel or even a fistula.

Suspect adherent bowel and even a fistula.

Yes. A conversion is probably needed.

8.7 In the diagram, where would you dissect next?

Yes, this will clear the peritoneum on the left side of Hartmann's pouch.

No, you have damaged:

The gallbladder.
The liver.
The cystic artery.
The cystic duct.

8.8 In the diagram, where would you dissect next?

Yes, this will clear the peritoneum on the right hand side of Hartmann's pouch.

No, you have damaged:

The gallbladder.
The cystic duct.
The liver.
The cystic artery.

QUIZ 9

9.1 In what percentage of cases can you see the cystic duct before dissecting?

1%

No, it is about 10%

10%

Correct

20%

No, it is only about 10%

50%

No, it is only about 10%

9.2 If a 300 Ligaclip clips only part way across the cystic duct, what would you do?

Put another 300 Ligaclip across the duct from the opposite side.

No, this is difficult, and unreliable

Convert to an open operation

No, 400 Ligaclips or Endoloops are better options, if you are certain that the duct is really the cystic duct

Try 400 Ligaclips
Yes, if you have a suitable clip applier
Use an Endoloop
Use this method if the 400 Ligaclip is not possible. You should use 2 Endoloops on the part of the duct which will be remaining

9.3 Which is the most serious longterm complication of laparoscopic cholecystectomy?
Damage to the common bile or hepatic ducts
Yes, these can cause endless problems with stricturing and reparative operations
Escape of stones from the gallbladder
Inside the abdomen these stones are virtually harmless. They may need to be removed from the subcutaneous tissues
Bowel damage
Bowel damage can be lethal early on, but does not usually cause long term problems
Hepatic artery damage
Bleeding from hepatic artery can be lethal early on. It only causes long term damage indirectly by accidental bile duct damage during efforts to control the bleeding.

9.4 The clips on the cystic artery must not clip any other tissue because:
You may be clipping the right hepatic duct
Yes, this is probably the major cause of damage to the right hepatic duct.
Danger of clipping the right hepatic artery
This an outside risk.
Danger of clipping the portal vein
This is an outside risk. You would be seriously lost to be anywhere near the portal vein.
Danger of clipping the jejunum.

This is an outside risk. You would be seriously lost to be anywhere near the jejunum.

9.5 In the diagram, is the arrowed structure :

The cystic duct

No, it is the common bile duct

The common bile duct

Yes. This is a very deceptive situation

Don't know

Good cautious answer. It happens to be the common bile duct.

The cystic artery

No, it is the common bile duct.

9.6 In the diagram, after 30 minutes of dissection, should you:

Convert to an open cholecystectomy

Yes. This is the wisest course.

Carry on a bit longer

No, the dangers of continuing are too great.

Cannulate the cystic duct

Only do this if you have the expertise. You are better to convert at this stage.

Call a more experienced surgeon

A move wise. He will probably advise a conversion.

9.7 In the diagram, is this the cystic duct?

No, it is the right hepatic artery

The traction on Hartmann's pouch will make this a common finding.

9.8 In the diagram, is this the the cystic duct?

No, it is the common bile duct

Do not be deceived by this appearance

9.9 In the diagram, are the clips correctly placed on the cystic duct?

No, they are encroaching on the common bile duct
This is a common cause of common bile duct damage.

QUIZ 10

10.1 How do you start the dissection of the gallbladder?
Elevate Hartmann's pouch
Correct.
Pull the fundus down
No, the best access comes from elevating Hartmann's pouch.
Rotate the patient
No, simply elevate Hartmann's pouch.
Grasp the clip on the gallbladder end of the cystic duct
No, simply elevate Hartmann's pouch.

10.2 How do you free the gallbladder from the liver bed?
Methodically coagulate/cut tight strands of tissue
Correct.
Dissect out vessels running from the gallbladder bed
No. You will not be able to find them as such.
Just coagulate/cut the tight bits
Increase the upward pull on the fundus
No. You may do this incidentally as you coagulate/cut the tight bits.
Elevate the liver
No. Just coagulate/cut the tight bits

10.3 On the diagram, click on the line you would choose to dissect the gallbladder

10.4 If the gall bladder leaks on dissection, should you:
Close the defect in the gallbladder with the forceps and continue dissecting
This is the best move if the defect is 2mm. or less, and the gallbladder is not distended.
Aspirate the gallbladder through the perforation

This is sensible if the gallbladder contains more than 5ml. of fluid.
Try keep stones from spilling out of the gallbladder.

Apply an Endoloop
Do this if the perforation is more than 2mm. long.

Ignore the leakage
This is not a good idea. It may contaminate the peritoneal cavity with infected bile.

10.5 If there is a bile leak from the gallbladder bed, would you:

Convert to an open operation
No, not at this stage. Identify and coagulate the vessel instead.

Expect that it will close spontaneously
No, a bile duct will not usually stop leaking spontaneously.

Identify and coagulate the vessel
Correct.

Apply local pressure
No, this will not work, unlike a blood vessel.

10.6 If the gallbladder jams in the epigastric port, would you:

Aspirate the gallbladder through the epigastric port.
Yes, as long as you can reach and open the gallbladder from skin wound.

Widen the epigastric port
Before doing this, try aspirating the gallbladder through the epigastic port.

Remove the stones from the gallbladder through the epigastric port
The first thing to do is try aspirating the gallbladder through the epigastic port.
Removing stones through the port is not usually successful. Crushing the stones using a sponge holding forcep is likely to be better.

Pull harder on the gallbladder

No, this will probably burst the gallbladder.

10.7 When would you consider closing the fascia after removing a port?

When the opening was wider than 10mm.

Correct.

For all ports

No. A 5mm. port does not need closing. A 10mm. port, if widened, should be closed.

In a fat patient

Probably not, unless the port had been widened.

If there was a leak from the gallbladder

No. Only if the defect was more than 10mm.

10.8 At what stage should you insert a suction drain?

After removing the gallbladder from the patient

No, this is too late.

After examining the gallbladder bed

Correct.

After removing the subcostal port

No. This is too late. You need to insert it down the subcostal port.

After cutting the cystic duct

No. This is too early. You may not need a drain at all.

9 DECISION CALCULATOR
HOW DIFFICULT?

	DIFFICULTY	DURATION
Abdominal adhesions		
Filmy	+1	+20
Dense	+4	+60
Gallbladder		
adhesions	+1	+10
Filmy	+4	+60
Dense	+1	+10
Equipment problems		
**MAKE THIS		
BUTTON	+1	+10
REPEATABLE	+3	+60
Thickened gallbladder		
Unclear cystic duct	+2	+30
and artery area	+1	+20
Bleeding	+2	+30
Wide cystic duct	+1	+20
Short cystic duct	+1	+10
Stone in cystic duct		
Absent cystic artery		
Hartmann's pouch	+4	+30
adherent to common		
bile duct	+1	+20
Difficult extraction of		
galllbladder		

WHEN TO CONVERT

Normal difficulty is 5
Convert if difficulty rises to 10
Make a CONVERT beacon flash when difficulty is 10
Plus a bleeper sounds

Normal duration is 45 minutes
Convert if duration rises to 150 minutes
Make a CONVERT beacon flash when duration is 150 minutes
Plus a bleeper sounds

0 LAPAROSCOPIC CHOLECYSTECTOMY THEATRE LAYOUT

PROCEDURE STEPS

1 **NON-SURGICAL EQUIPMENT LIST**

2 **VIDEO SYSTEM (WOLF)**

2190.20 VIDEO TROLLEY WITH ISOLATION TRANSFORMER

5370.01 CCD VIDEO CAMERA complete with Control Unit

5261.27 27mm. LENS

5370.52 20" SONY MONITOR

3 **VIDEO RECORDER**

5631.01 SONY U-MATIC RECORDER (VO 7630)

4 **LIGHT SOURCE**

5108.01 AUTO IRIS HIGH POWER LIGHT SOURCE

5 **CABLES**

815.009 HIGH FREQUENCY CONNECTING CABLE FOR ELECTRODES AND PROBES

8106.009 HIGH FREQUENCY CONNECTING CABLES FOR FORCEP

6 **INSUFFLATION SYSTEM**

2154.75 HIGH FLOW INSUFFLATOR with recirculating Smoke Filter System including sterile filters.

7 **SPARES**

STERILE FILTERS for insufflator.

CO2 CYLINDER

SPARE LIGHT BULB

SPARE FUSES

8 **STANDARD STERILE SURGICAL EQUIPMENT (FRIARAGE HOSPITAL)**

1 X MINOR PACK
3 X SPONGEHOLDERS
2 X GALLIPOTS
1 X MEDIUM RECEIVER
2 X SMALL RECEIVER
1 X MEDIUM BOWL
2 X LARGE WATER BOWLS
1 X NO 3 KNIFE HANDLE
1 X 15 Swann MORTON BLADE
2 X LITTLEWOODS FORCEP
4 X CURVED JOLLS FORCEP
2 X ROBERTS FORCEP
1 X GROOVED HERNIA DIRECTOR
1 X THYROID ENUCLEATOR
1 X POLYP FORCEP
1 X 5" STRAIGHT SCISSORS
1 X MCINDOES SCISSORS
2 X SMALL LANGENBECK RETRACTORS
2 X LARGE LANGEBNBECK RETRACTORS
1 X HEAVY NONTOOTHED FORCEP
1 X 2ML SYRINGE FOR ULTRASTOP
1 X 2O ML SYRINGE FOR 20ML 0.25% BUPIVACAINE
1 X GREEN 21 SWG NEEDLE FOR BUPIVACAINE 20 ML. 0.25% PLAIN
1 X SMALL NEEDLE HOLDER
1 X DIATHERMY SHEATH

1 X SUCTION TUBING
1 X IRRIGATION TUBING
1 X GIVING SET
1 X PLASTIC SHEATH FOR CAMERA LEAD AND STERILE ADHESIVE STRIP
1 X POOLE SUCKER
8 X TOWEL CLIPS
10 X COTTON BUDS
2 X FINE DIATHERMY LEADS
1 X INSUFFLATION TUBING
1 X PACKET SUTURE STRIPS
1 X VERESS NEEDLE

11 **SPECIAL STERILE SURGICAL EQUIPMENT**

12 **TELESCOPES**

8934.441 PANOVIEW TELESCOPE 0 10MM. DIAMETER

8061.455 LIGHT TRANSMITTING CABLE 2.4M LONG

13 **TROCARS AND SLEEVES**

2 X 8934.03 10MM. TROCAR SLEEVE WITH PISTON VALVE

2 x 8934.12 10MM. TROCAR WITH PYRAMID TIP

8936.901 REDUCING SLEEVE 10MM. - 5MM.

2 X 8940.03 5MM. TROCAR SLEEVE WITH PISTON VALVE

2 x 8940.12 5MM. TROCAR WITH PYRAMID TIP

14 **VERESS NEEDLE**

2 X 8302.12 VERESS NEEDLE

15 **FORCEP, SCISSORS AND CLIP APPLIERS**

8385.10 GRASPING FORCEP WITH LARGE TEETH 10MM. (THE ROTWEILERS)

2 X 8383.306 GRASPING FORCEP WITH TEETH WITH LOCK (THE BEAKS)

8383.141 ATRAUMATIC GRASPING FORCEP 5MM. FLAT (THE RACQUETS)

2 X 8383.02 HOOKED SCISSORS 5MM.

1 X 8389.801 LIGACLIP APPLIER

1 X 8383.302 ATRAUMATIC GRASPING FORCEP (THE SPOONS)

16 **SUCTION/IRRIGATION PROBES**

8383.732 SUCTION AND IRRIGATION PROBE 5MM.

17 **HOOK ELECTRODES**

2 X 8383.421 HOOK ELECTRODES 5MM.

18 **MISCELLANEOUS**

815.009 HIGH FREQUENCY CONNECTING CABLE FOR ELECTRODES AND PROBES

8106.009 HIGH FREQUENCY CONNECTING CABLE FOR FORCEP

89.08 10MM. SEALING CAPS PER 10

89.02 5MM. SEALING CAPS PER 10

88.02 SEALING CAPS FOR FORCEP PER 10

8383.78 INTRODUCER FOR ETHIBINDERS / ENDOLOOPS

SUTURE INTRODUCER

19 **SURGICAL DISPOSABLES**

171025 SURGIPORT DISPOSABLE TROCAR 10MM 50.00

176615 ENDOCLIP DISPOSABLE APPLIER 110.00

?175006 SURGIPORT CONVERTER 5.5MM. 5.00

20 **SURGICAL DISPOSABLE SPARES**

178009 ENDOCLIP 10 ML ACCESSORY KIT 286.00

1 ENDOCLIP ML DISPOSABLE APPLIER WITH MEDIUM- LARGE TITANIUM CLIPS

1 SURGIPORT 10MM. TROCAR WITH 1 STAINLESS SLEEVE, 1 RADIOLUCENT SLEEVE

1 SURGIPORT 5MM. TROCAR WITH 1 STAINLESS SLEEVE, 1 RADIOLUCENT SLEEVE

1 SURGINEEDLE 120MM. INSTRUMENT

2 SURGIGRIP 5MM. DISPOSABLE SLEEVES

1 SURGIGRIP 10MM. DISPOSABLE SLEEVE

3 SURGIPORT CONVERTERS 3.5MM., 4.5MM.,5.5MM

ENDO-SHEARS DISPOSABLE SCISSORS

ENDOLOOP SUTURES

2 X EH495G CHROMIC CATGUT 1 69.00

10MM. DISPOSABLE SEAL

5MM. DISPOSABLE SEAL

1 X PORTOVAC

1 X ETHICON W779 STITCH FOR PORTOVAC

21 **THEATRE FURNITURE**

1 X LARGE TROLLEY

1 X SMALL TROLLEY

1 X DRIP STAND

1 X PRESSURE INFUSOR

22 **MATERIALS**

ARTERIAL SLOOP

FASCIA CLOSURE NO 1 VICRYL (ETHICON W9251)

SUTURESTRIPS

SKIN SPRAY NOBECUTAINE

SKIN DRESSING MEPORE

BACTERIOLOGY SWAB

23 **PHARMACEUTICALS**

CEFUROXIME 1.5 G. IV

IRRIGATION SALINE 500ML 0.9% + 1G TETRACYCLINE (NO HEPARIN)

SKIN INJECTION BUPIVACAINE 2OML 0.25%

DICLOFENAC SUPPOSITORY

24	**ASSORTED EXTRAS AND ITEMS FOR FUTURE PURCHASE**	
		20" SONY MONITOR
		UNICOL MONITOR STAND for 2nd Monitor
		8385.13 GRASPING AND EXTRACTING FORCEP 10MM. (NO LOCK)
		8389.801 CLIP APPLICATOR FOR ETHICON TI 300 CLIPS
		8383.022 SCISSORS INSULATED
		28378 C RIMMER OLSEN CHOLANGIOCATHETER GUIDED GRASPER
		3MM. NEEDLE HOLDER FOR INTERNAL SUTURES
		5MM. NEEDLE HOLDER FOR INTERNAL SUTURES
25	?	
26	**VIDEO CAMERA CHECKS**	
27	PLUG IN AT THE WALL Orange lead	
28	PLUG IN AT MULTISOCKET BOARD	
29	PLUG POWER LEAD INTO THE BACK OF THE ENDOCAM CONTROLLER UNIT	
30	SWITCH ON AT THE WALL	

31 PREPARE THE CAMERA

Choose the oblique viewing camera which is in the bottom drawer of the video stand.

Remove the cover from the camera lens by squeezing the 2 spokes on the camera. Unscrew one of the spokes if needed to unlock the system.

Push fit the camera lead onto the camera.

32 PLUG THE CAMERA LEAD INTO THE FRONT OF THE CONTROLLER

The lead will plug in 1 way only.

33 SWITCH ON THE CAMERA

(GREEN BLOCK SWITCH ON THE RIGHT) The colour bar lights up.

34 **PRESS THE CAMERA BUTTON**

The video level will be automatically controlled.

You can adjust the colour, but not the video level.

VIDEO RECORDER CHECKS TO BE ADDED

INSTRUCTIONS FOR SETTING UP THE VIDEO

Use a Sony DA Pro-4 head. This will be on top of the General Surgical television, or on the top of the Gynae Television.

Place it on the top of the General Surgical Television with the control panel facing forwards.

Find the video lead which should be on the video itself.

Plug the video lead into the back of the video. The socket is called Euro-AV and has a red diamond.

Plug the other end of the video lead into the back of the television in the AV socket; labelled DO NOT TOUCH!.

Check the power supply is plugged into the back, labelled AC IN.

Plug the power supply into the extension lead from the wall plug.

Check the standby light is on at red, meaning that the power is available. Press the ON STANDBY button which will show then a green light.

Check you have VHS tape with an adequate amount of free tape. The unused tape is on the left spool when you are looking at the top of the tape cassette. My tape will be in the bottom drawer of the General Surgery laparoscopic Unit.

Push the cassette through the cassette flap on the front of the video which is labelled DA PRO-4 HEAD. It will go right in and the flap will drop down again.

Next, turn to the video control handset. Lift the front lid of the handset, Press Input Select on the handset to get line 1 showing on the control display on the video front.

Hold the handset at the same height as the video machine to get a proper response here. It should show as L1 and not just 1.

Next, still holding the handset high, press the two record buttons on the handset. The red light shows on the display on the front of the video, saying record. Look for the rotating spools showing on the display and the timer will be running.

To stop the video, press either the STOP button on the front of the video or on the handset.

To fast forward, reverse, play and stop after the recording is made you press the PLAY and STOP buttons on the circular control switch, rotate the control switch as needed to reverse or forward.

For high speed rewinding, press the HIGH SPEED REWINDING BUTTON. You can also use the PAUSE button to stop.

To EJECT, press the EJECT button on the left side of the front of the video.
To insert the Timer, press the Timer on screen in the centre of the handset. To remove the Timer, press the CLEAR button, just to the right of the Timer On Screen button,

35 **CHECK THE LEVER IS ON DAYLIGHT 5600 K.**

TV MONITORS CHECKS TO BE ADDED

1 monitor - 75 ohm switch ON
2 monitors - 75 ohm switch OFF

Monitor A on its own:
75 ohm (line A) switch on back control panel on Monitor A to ON.

Both Monitors A and B in use:
Plug Monitor B into wall socket.
Switch on at wall.
Plug 6metre connecting lead into OUT socket on line A 75 Ohms on monitor A.
Plug other end into IN socket on line A 75 ohms on monitor B.
Switch monitor A Line A75 ohm switch to OFF.
On monitor B line 75 ohm switch to ON

NB When disconnecting Monitor B connecting lead, Check Monitor A line A switch is switched back to ON

Ii monitor does not work, check monitor A line A switch is switched to ON.

?This refers to what?
1 Orange lead.
2 Switch on monitor - press POWER button.
3 Check flow is OFF. If not, change Flow Selectot to zero.
4 Check Volume is 00.0. If not, press reset button.
5 Press camera power switch.

Unscrew CO2 bottle tap 4 x 180.
Check gas in bottle dial - needle in green. If not, check bottle opening, or fit new bottle.

36 **LIGHT SOURCE CHECKS**

37 PLUG IN AT WALL SOCKET

38 PLUG IN AT MULTISOCKET BOARD

39 PLUG POWER LEAD INTO THE BACK OF THE LIGHT SOURCE

40 SWITCH ON AT WALL

41 SWITCH ON LIGHT SOURCE AT CONTROL PANEL

42 SWITCH HIGH POWER LIGHT SWITCH TO 1

This is the switch with the 6 ray sign.

43 CHECK THE START LIGHT LIGHTS UP

(= THE ORANGE START BUTTON)

44 FIRE UP THE BULB

Press the ORANGE START BUTTON once.

Check light comes out of the outflow.

45 SWITCH VIDEO BRIGHTNESS CONTROL TO AUTOMATIC

Manual control is possible here, with the level switch moved towards the word MANUAL.

46 ADJUST THE BRIGHTNESS

Turn the knob to the left of the level switch.

47 ADJUST THE COLOUR

(ON THE MONITOR CONTROL PANEL)

Adjust the picture for redness and blueness with the levers on the camera control board.

?48 WOLF RIWOPLAN 2190.20?
5130 AUTO LP
Switch on 0 --- 1
Press integral button
Check integral button is at 2.5
Press green start button on right
To switch off, press green start button again

49 **INSUFFLATOR CHECKS**

50 PLUG IN AT WALL

51 PLUG IN AT MULTISOCKET BOARD

52 PLUG POWER LEAD INTO BACK OF INSUFFLATOR

53 CHECK CO2 VALVE ON THE CO2 BOTTLE IS OPEN Turn the handle anticlockwise

54 CHECK CO2 RESERVE

The needle should be in the green quadrant on the pressure dial.

If the needle points to a lower pressure, replace the gas cylinder with a full one.

55 SWITCH ON AT WALL

SWITCH ON AT FRONT PANEL ON YOUR RIGHT HAND SIDE

56 PRESS INTERNAL TANK BUTTON

Press until the CO_2 volume dial is at ZERO.

ZERO means the internal tank is full

57 PRESELECT THE CO_2 PRESSURE TO 12MM. MERCURY

Keep pressing the positive and negative Preselector buttons to light up the bar on the dial to 12.

58 PRESS "INSUFFLATION" ON THE FLOW BUTTON

Start it 1 litre per minute.

Check the kicking of the ball in the flow tube.

59 CHECK THE INTRA ABDOMINAL PRESSURE MEASURER

Block the CO_2 outflow with your finger tip, so that the ball drops to the bottom of the tube.

Check the pressure on the display equals the pressure on the pressure Preselector.

60 **SMOKE EVACUATOR CHECKS**

The smoke evacuator is on the left of the Insufflator.

61 FIT THE UNSTERILE SMOKE FILTER

Place the white unsterile filter into the blue stopper in the top of the glass collecting bottle.

Check there is a tight fit.

62 FIT THE CONNECTING TUBE

Push the metal end of the connecting tube onto the unsterile filter box.

Push the other end of the connecting tube into the Pump Outlet.

The Pump Outlet is marked with "Vacuum" and an arrow pointing downwards.

63 FIT THE STERILE FILTER

Push the sterile filter onto the Out Suction.

The Out Suction has an upward pointing arrow pressure mark.

64 FIT THE RIGHT ANGLE EXTENSION TUBING

Fit the right angle extension into the insufflator Outlet Port just below the glass flow chamber.

65 FIT THE LONG CONNECTING TUBE

Fit the plastic end of the long connecting tube onto the Blue cap on the collection bottle (plastic to plastic).

Fit the metal end of the long connecting tube onto the outlet tube from the patient.

The tubing is now ready to be connected with the sterile tubing from the patient.

66 **DIATHERMY CHECKS**

67 FOR ESCHMANN DSO 402-S DIATHERMY MACHINE

68 PLUG IN AT THE WALL SOCKET

69 SWITCH ON AT THE WALL SOCKET

70 CHECK THE LEAD OF THE BLUE COAGULATION FOOT PEDAL IS PLUGGED FULLY INTO THE BACK OF THE MACHINE AT THE BLUE BLOT

(LABELLED COAGULATION PEDAL LEAD)

71 CHECK THE LEAD OF THE YELLOW CUTTING FOOT PEDAL IS PLUGGED FULLY INTO THE BACK OF THE MACHINE

(LABELLED CUTTING PEDAL LEAD)

72 CHECK THERE IS A DIATHERMY PAD ON THE PATIENT

Check the pad has not peeled off the patient's skin.

73 CLIP THE PAD LEAD ONTO THE DIATHERMY PAD

Check the lever or button on the lead clip faces the non-sticky side of the pad.

74 PLUG THE PATIENT PAD LEAD INTO THE SOCKET TO THE LEFT OF THE MAN SIGN ON THE FRONT OF THE MACHINE

(LABELLED PATIENT PAD LEAD)

75 CHECK THERE IS A BLUE PLUG IN THE DIATHERMY LEAD

SOCKET TO THE RIGHT OF THE MAN SIGN

(LABELLED DIATHERMY LEAD SOCKET)
NB The blue plug is for a hooked lead from the diathermy tool. If the lead has a probe end, remove the blue plug. Insert the probe into the RED socket to the right of the blue plug

76 CHECK THE BLUE PLUG IS PUSHED FULLY HOME

77 UNSCREW FULLY THE KNOB ON THE BLUE PLUG

Unscrew the knob until the unthreaded part of the shaft is seen.

78 HOOK THE DIATHERMY HOOK ONTO THE SHAFT OF THE BLUE PLUG

For a probe end, use the red socket and take out the blue plug

79 TIGHTEN UP THE KNOB ON THE BLUE PLUG UNTIL THE HOOK STARTS TO REVOLVE

80 PRESS THE Z SWITCH DOWN FROM 0 TO 1

81 PRESS THE NEXT SWITCH ON THE LEFT DOWN FROM 0 TO 1

82 PRESS THE 0 SIGN FOR AIR COAGULATION (FOR THE 402-RS PRESS THE UPPER BLACK SQUARE UNTIL

THE UPPER RED LIGHT SHOWS)

83 TURN THE KNOB ON THE BLUE DIATHERMY DIAL TO 4

84 PRESS THE PAD SIGN ON THE LEFT TO GET MONOPOLAR CURRENT

A light will come on in the pad sign. (PRESS THE WHITE SQUARE WITH THE BLACK DOT ON THE 402-RS TO GIVE A RED LIGHT) (WHITE PEDAL = BIPOLAR)

85 TURN THE KNOB ON THE YELLOW CUTTING DIATHERMY DIAL TO 4

86 PLACE THE DIATHERMY PEDALS

Place the pedals to the right of the surgeon's feet.

Place the yellow cutting pedal to th right of the blue coagulation pedal.

87 TIDY AWAY DIATHERMY LEADS FROM THE SURGEON'S FEET

88 IF THE DIATHERMY ALARM SOUNDS

CHECK DIATHERMY HOOK IS TIGHTLY FASTENED

CHECK THE DIATHERMY LEAD PLUGS ARE FULLY PUSHED IN

CHECK THE CLIP ON THE DIATHERMY PAD IS FASTENED PROPERLY

CHECK THE PEDAL LEAD PLUGS ARE FULLY PUSHED IN STEP NUMBER 66

REPLACE THE BROWN DIATHERMY LEAD AND YELLOW PLATE LEAD

CALL AN ODA

89 IF THE DIATHERMY FAILS TO BUZZ AND COAGULATE/CUT

CHECK THE WALL SWITCH IS SWITCHED ON

CHECK THE WALL SWITCH IS FULLY PRESSED IN

CHECK THE MONOPOLAR PAD SIGN IS PRESSED

CHECK THE PEDAL LEAD SOCKETS ARE PRESSED HOME

REPLACE THE PEDAL LEADS

CALL AN ODA

IF THE DIATHERMY BUZZES BUT THERE IS NO COAGULATION

CHECK DIATHERMY LEAD IS CONNECTED TO THE MACHINE
CHECK DIATHERMY LEAD IS NOT CRACKED
CHECK THERE IS NO TEMPORARY LEAD IN PLACE IN THE SOCKET

OPSTEP
001 **PATIENT CHECKS**
002 CHECK YOU HAVE THE CORRECT PATIENT

003 CHECK THE DIAGNOSIS

EG
Good history of biliary colic or cholecystitis.

Stones in the gallbladder.

No stones in the common bile duct.

Serum bilirubin normal.

004 CHECK THERE IS NO OTHER PROCEDURE TO DO

005 CHECK THERE IS CONSENT FOR AN OPEN OPERATION IF NEEDED

006 CHECK THE PATIENT HAS EMPTIED THE BLADDER WITHIN THE HOUR

007 CHECK THERE IS A RADIO-LUCENT OPERATING TABLE FOR POSSIBLE CHOLANGIOGRAPHY

008 CHECK THERE IS A DIATHERMY PAD

009 CHECK THERE IS A NASOGASTRIC TUBE AVAILABLE

010 CHECK THE PATIENT HAS HAD 1.5G CEFUROXIME INTRAVENOUSLY

011 CHECK PATIENT HAS HAD 5000 UNITS OF

CALCIUM HEPARIN
SUBCUTANEOUSLY

012 **ANAESTHESIA**

General anaesthesia

013 **POSITION**

Place the patient supine.

Wrap the arms up on the chest.

Get access from above nipples to mid-thigh and from one posterior axillary fold to the other.

Check the table is horizontal.

014 **STANCE**

Stand on the patient's left side.

Place your 2nd assistant opposite.

Place your 1st assistant (cameraman) on your left.

Place the scrub nurse opposite the cameraman.

015 **OFF-PATIENT EQUIPMENT POSITIONING**

Place near the patient's right shoulder:

The main video stand.

The monitor.

The video controller.

The light source

The CO_2 insufflator

Place near the patient's left shoulder:

The diathermy/sucker machine

Place near the patient's left side of face:
The irrigation system (a litre bag of Saline solution on an IV stand)

Place near the patient's right foot:
The instrument table.

The spare equipment table

016 **SKIN PREPARATION**

Clean the skin:
Fom the nipples to the pubis.

From the posterior axillary fold on the right side to the anterior axillary fold on the left.

Use two swabs on sticks with 0.5% chlorhexidene in 70% propanol, followed by one to dry off.

017 **APPLYING DRAPES**

018 PLACE A PAPER TOWEL UP TO THE PUBIS

019 PLACE A LARGE LOWER TOWEL UP TO THE PUBIS

020 PLACE A LARGE TOWEL DOWN TO THE XIPHISTERNUM

021 PLACE A LEFT DRESSING TOWEL TO THE LEFT ANTERIOR AXILLARY FOLD

022 PLACE A RIGHT DRESSING TOWEL TO

BEHIND THE RIGHT MID AXILLARY LINE

023 FIX THE TOWELS TO THE SKIN WITH 4 TOWEL CLIPS

024 **ON-PATIENT EQUIPMENT PREPARATION AND CHECKS**

025 FIT THE EQUIPMENT TO THE RIGHT OF THE SURGEON

I.E. 2 TUBES AND 2 WIRES (1 IRRIGATION TUBE, 1 SUCTION TUBE, 2 DIATHERMY LEADS)

026 FASTEN THE DIATHERMY HOLDER TO THE TOWELS

Place the holder on the towels over the right lower chest so that it hangs down on the patient's right hand side.

Fasten the holder to the towels with a towel clip.

027 PLACE THE IRRIGATION TUBING

Place the tubing on the upper towel.

Unwind the coils thoroughly.

Pass the end to be fitted to the irrigation system to an unscrubbed nurse.

Check the nurse pushes the plastic needle thoroughly into the neck of the saline bag on the IV stand.

028 FIT THE IRRIGATION TUBING ONTO THE

RIGHT HAND TUBE ON THE SUCTION/IRRIGATOR

Check the irrigator stop works freely.

029 RUN THE IRRIGATION TO REMOVE BUBBLES FROM THE TUBING

Check the irrigation tubing clips are open.

Catch the saline in a receiver.

030 PLACE THE SUCKER TUBING

Place the tubing on the upper towel.

Unwind the coils thoroughly.

Pass the uncut end to be fitted to the suction machine.

031 FIT THE SUCKER TUBING TO THE SUCTION/IRRIGATOR

Push the cut end of the suction tubing onto the left hand tube of the suction/irrigator until it covers the tube completely.

032 CHECK THE SUCTION IS WORKING

Check the suction tap depresses freely.

Press the suction tap on the suction/irrigator to check there is a reading of 0.2 on the suction apparatus.

033 PLACE THE SUCTION/IRRIGATION PROBE IN THE DIATHERMY HOLDER

034 CHECK THE DIATHERMY PEDAL IS AT YOUR RIGHT FOOT

035 PLACE 1 DIATHERMY LEAD

Check this is the MALE lead with a central spike to fit the hook dissector.

Place the lead on the upper towel.

Pass the other end (a hook or a probe) to fit on the diathermy machine.

Check the hook is screwed properly onto the blue plug on the diathermy diathermy machine.

Check the probe is plugged into the socket with the lightning mark, AND THE BLUE PLUG IS REMOVED.

036 FIT THE DIATHERMY LEAD ONTO THE HOOK ELECTRODE

Check there is a tight fit. If not, replace the hook electrode.

037 PLACE THE HOOK ELECTRODE IN THE DIATHERMY HOLDER

038 SWITCH ON THE DIATHERMY MACHINE

If the alarm sounds:

Check the diathermy lead hook is tightly fastened.

Check the diathermy plugs are fully pushed in.

Check the clip on the diathermy pad is fastened properly.

Check the pedal lead plugs are fully pushed in.

Replace the diathermy lead.

Call an ODA.

039 CHECK THE DIATHERMY BUZZES ON PRESSING THE DIATHERMY PEDAL

If not:

Check the wall switch is switched on.

Check the wall switch is fully pressed in.

Check the monopolar pad sign is pressed.

Check the pedal lead sockets are pressed home.

Replace the pedal leads.

Check the blue plug is firmly in place, OR if a probe lead, remove the Plug.

Call an ODA.

040 CHECK DIATHERMY STRENGTH

Coagulation 4.

Use only the Coagulation current for cutting as well as coagulation.

Do not use the Cutting current.

041 PLACE THE SECOND DIATHERMY LEAD

Check there is a FEMALE end (with a space to fit the dissecting forcep).

Place the lead on the upper towel.

Pass the distal end to dangle below the towels ready for attachment to the diathermy machine if needed.

042 FASTEN SUCKER, IRRIGATION, AND THE 2 DIATHERMY LEADS TO UPPER TOWEL

Use a towel clip

043 FIT THE EQUIPMENT TO THE LEFT HAND OF THE SURGEON

I.E. 3 TUBES
(1 INSUFFLATOR TUBING, 1 LIGHT CABLE, 1 CAMERA LEAD)

INSUFFLATOR TUBING

Run the tubing round the right side of the drapes.

Pass either end of the tubing to be fitted into the insufflator by the technician.

Blow CO2 along the insufflator to remove Cidex.

Keep 30cm. of tubing free to allow the cameraman mobility with the laparoscope.

045 PLACE THE LIGHT CABLE

Run the light cable round the right side of the drapes.

Pass the long metallic end of the light cable to be fitted into the light source. by the technician.

Keep 30cm. of cable free to allow the cameraman mobility with the laparoscope.

046 HOLD OUT THE CAMERA LEAD SHEATH TO THE ODA

Have the ODA hold and keep open the upper end of the sheath.

Hold the bottom of the sheath yourself.

047 HAVE THE CAMERA WITH CAMERA LEAD DROPPED INTO THE SHEATH

Have the ODA hold the sheath vertically so the camera slides with its lead to within 5cm. of the patient's end of the sheath.

Pinch the bottom of the sheath to prevent the camera dropping onto the sterile towels.

048 COVER THE CAMERA LEAD WITH THE SHEATH

Hold the camera in the bottom of the sheath.

Have the ODA pull on the top of the sheath to slide it over the full length of the lead.

049 PLACE THE CAMERA LEAD AND SHEATH

Run the lead and sheath round the right side of the drapes.

Keep 30cm. of lead free to allow the cameraman mobility with the laparoscope.

050 GET THE 10MM. TELESCOPE

051 CONNECT THE CAMERA TO THE TELESCOPE

Keep the ends of the camera sterile by handling them through the plastic sheath.

Fit the telescope end into the camera socket by squeezing together the 2 spokes on the camera through the sheath.

Unscrew the fixed spoke to allow the camera eyepiece to rotate in the fitting.

Tighten up the fixed spoke if you wish to prevent this happening.

Check Ultrastop has been put on both ends of the telescope.

052 SEAL THE SHEATH AROUND THE TELESCOPE

Use the sterile adhesive strip.

Fasten the sheath tightly around the neck of the telescope.

053 CHECK THE CAMERA FOCUS

Rotate the knurled collar on the camera through the camera sheath to get the monitor picture in focus.

If the picture is not clear, suspect condensation in the camera/lead junction. Hand the camera and lead to the ODA for inspection and cleaning.

054 FASTEN CAMERA LEAD, INSUFFLATOR, AND LIGHT CABLE TO THE TOWELS

Use a towel clip.

Check there will be at least 30cm. slackness in the lines to allow free movement of the camera.

055 CHECK THE CAMERA IS WORKING

056 CHECK THE LIGHT SOURCE IS SWITCHED ON

Check the light does not burn a hole in the drapes or harm the patient's skin.

057 CHECK THE MONITOR IS IN LINE

The monitor should be in line with the expected position of the gallbladder as seen by the surgeon. This will minimse orientation difficulties for the surgeon.

058 CHECK THE MONITOR PICTURE IS CLEAR

If not:

Rub the laparoscope lens with a cotton wool bud moistened with saline.

Apply a drop of liquid lens cleaner. (Ultrastop)

Shake the end of the camera to remove surplus liquid.

Check Ultrastop has been put on both ends of the telescope.

If still not clear, rub the lens vigorously with a gauze to remove any fatty deposit on the lens.

059 CHECK THE FOCUS AGAIN

Turn the knurled focussing collar round the neck of the camera.

060 CHECK THE CAMERA ROTATION

Keep the 12 o'clock position on the camera at the 12 o'clock position on the monitor.

Do this by keeping the raised "Wolf" logo on the camera shaft uppermost at all times.

Make sure the cameraman understands this.

Avoid rotation of the camera under the weight of the lead.

Avoid rotation of the port, which can cause kinking or detachment of the insufflation tubing.

Keep the arrow on the screen at 12 o'clock.

061 CHECK THE BRIGHTNESS

Turn the Brightness control on the Camera Unit.

Use the manual control. Avoid glare spots and a dark picture.

062 CHECK THE CONTRAST

Turn the Contrast control on the Camera Unit.

063 CHECK THE RED/ BLUE MIX

On the Camera unit.

On the Monitor controls to the left of the monitor screen.

064 CHECK THE CAMERAMAN

The cameraman controls the success of the operation. He needs to change from being a passive TV viewer, to being an active exhibitor of all the laparoscopic steps of the operation

Hold the camera with the right hand.

Steady the port with the left hand to prevent the sleeve slipping out, or causing gas leaks.

Keep the operating field in the centre of the screen at all times.

Zoom in and out as needed.

In particular, zoom out to show the inner ends of the ports when instruments are being passed through.

Make small, slow movements with the camera. Large and sudden movements break the continuity of the picture.

Avoid unconscious rotation of the camera away from vertical.

Check the Wolf sign is always vertical.

Keep any fluid levels on the monitor horizontal.

Keep any dangling tissues or fluid drips on the monitor vertical.

Keep the camera lead slack to prevent sharp angulation damaging the lead fibres.

Check the focus if the picture loses its sharpness.

Have the brightness adjusted by the knob on the control panel to correct darkness or whiteouts.

Anticipate the surgeon's movements. Experienced camera users will be able to steer the surgeon through the operation.

065

PNEUMOPERITONEUM CREATION

090103
Insert
Open insertion of the umbilical port

Periumbilical incision

Dissect through the subcutaneous fat to demonstrate a 5 x 5 cm area of linea alba.

This is a firm layer of pinky/whitish tissue with strands of fibrous tissue running across and up and down.

Use Langenbeck retractors for access.
Pick up the linea alba with 2 Littlewoods forceps.
Cut through the linea alba between the forceps with a scalpel.

Hold the edges of the linea alba opening with the forceps.
Insert a loose purse string round the opening.
- Use No 1 nylon (Ethicon W749).
- Leave the ends 15 cm. long.
- Place an artery clip on the ends of the nylon.

Dissect through the extraperitoneal fat with dissecting scissors.
Identify the peritoneum.
- This is a thickened pinky layer.
  - If you can't find it:
    - Dissect more deeply.
  - If you open the peritoneum:
    - Pick up the edges with Moynihan forceps and continue as below.

Pick up the peritoneum with 2 Moynihan forceps.
Open the peritoneum by cutting with a scalpel held flat.
Hold the peritoneal edges up with the forceps.
Let the intraperitoneal contents drop back.
- If you can't find the peritoneal opening:
  - There may be adhesions in the peritoneum.
  - Place a finger in the wound to see if you can free off any adhesions.
- If you still cannot find the peritoneal cavity:
  - Dissect more deeply.
  - Call a more experienced surgeon.

Make a 15mm. opening in the peritoneum.
- Use dissecting scissors.

Inserting the umbilical port.
- Do the standard checks.

Insert the port through the opening.
- Pass it 8cm into the peritoneal cavity.

Tighten the linea alba purse string with one throw.
Wrap the nylon 3 times round the port and tie again.
Clip the ends of nylon with the artery forcep.
Slide any antileakage bung down the port to the depths of the subcutaneous fat.
Screw any antileakage bung into the subcutaneous fat.
Remove the trocar.
Insert the telescope.
Attach the gas supply.
Insufflate.
If there is a gas leak:
- Insert a purse string round the periumbilical skin.
- Use No 1 nylon (Ethicon W749)

If there is still a gas leak:
- Insert another purse string into the periumbilical skin.

Consider stitching the arms of the anti leak bung to the skin.

066 CHECK THE VERESS NEEDLE

Check it is a non-disposable Veress needle.

Check the point is sharp.

Check the central probe pushes in and springs back freely.

Check the CO_2 tap moves freely.

067 CONNECT THE INSUFFLATOR TUBING TO THE VERESS NEEDLE

068 SWITCH ON CO_2 FLOW AT 1 LITRE PER MINUTE

069 OPEN GAS FLOW TAP ON THE VERESS NEEDLE TO CONFIRM A FLOW

This will show as:

0 to 2mm. in the pressure register on the insufflator

The ball rises in the flow column

The insufflator clicks.

A block in the needle or tubing shows up as:

12-15mm. in the pressure register

Ball does not rise in the flow column

The insufflator does not click

The insufflator alarm sounds

070 SWITCH OFF THE INSUFFLATOR 1 LITRE FLOW

Press 4L/min HIGH FLOW

Press 4L/min AUTOMATIC

Press1L/min FLOW 071 CHECK THE GAS FLOW TAP ON THE VERESS NEEDLE IS OPEN

This will let any blood or bowel contents flow up the needle. It will be an early warning of a problem.

The tap on a non-disposable Veress needle is open when it lies in the line of the inflow tube.

NB. An Autosuture disposable Veress needle has a gas flow tap which is OPEN when the tap lies ACROSS the tube, unlike any other tap

072 CHOOSE A SITE FOR THE VERESS NEEDLE

Normally this is in the inferior crease of the umbilicus.

For previous surgery in the lower abdomen, consider the epigastric site 2cm. below and 2cm. lateral to the xiphisternum.

For previous surgery in the upper abdomen, consider a lateral site 2cm. above the anterior superior iliac spine in the mid-axillary line.

For suspected more serious adhesions, make an opening under direct vision for

the insertion of the camera port in the umbilical site.

073 UMBILICAL VERESS NEEDLE PUNCTURE

074 INCISE THE SUPRA-UMBILICAL SKIN

Use a no.15 Swann-Morton scalpel.

Make a 15mm. curved incision in the lower surface of the umbilicus (ie. pi x the radius of the 10mm. port for a tight fit)

Cut through the skin only to avoid bleeding from the subcutaneous vessels

075 GRASP THE SUBUMBILICAL FAT

Use your left hand to elevate and pull caudally a generous handful of abdominal wall below the umbilicus.

If your hand is not strong enough, use 2 Littlewoods forcep to elevate the subumbilical abdominal wall.

076 PUSH IN THE VERESS NEEDLE

Use your right thumb and index to hold the needle by the roughened collar like a dart.

Push the needle through the skin incision.

Aim in the midline towards the coccyx.

Rotate the needle as you pass the needle more deeply.

Feel the needle pop through the linea alba.

Feel the needle pop through the peritoneum as a definite second event.

Listen for the click as the central probe springs down to prevent the needle damaging the intraperitoneal contents.

The needle may need to pass 10cm. or more to reach the peritoneum in a fat patient.

077 OPEN THE CO_2 GAS TAP ON THE VERESS NEEDLE

078 SWITCH ON THE CO_2 FLOW AT 1 LITRE/MIN

79 MAINTAIN YOUR GRASP ON THE LOWER ABDOMEN

Maintain the grasp until the abdomen is visibly distended with gas.

080 USE ONLY THE FOLLOWING SEQUENCE FOR THE CO_2 FLOW

1 LITRE PER MINUTE

THEN 4 LITRES PER MINUTE FIXED

THEN 4 LITRES PER MINUTE AUTOMATIC

Only insufflate at the 4 litres per minute rate when you can insufflate without difficulty at 1 litre per minute.

This will minimise dangers of insufflating the abdominal wall, the falciform ligament, or vessels.

You will not be able to switch directly from the 1 litre rate to the 4 litres automatic.

081 CHECK CO2 IS FLOWING INTO THE PATIENT

The flow ball will rise.

The flow recorder will tick.
The CO2 delivery pressure falls to 7-8mm. mercury.

The abdomen will begin to distend uniformly, and will become resonant.

082 INCREASE CO2 FLOW TO 4 LITRES PER MINUTE FIXED

083 IF UNSATISFACTORY FLOW

Check the lower abdomen is properly held up.

Check the tubing is not kinked.

Move the angle of the Veress needle to clear any minor obstruction at the tip.

Check the CO2 reservoir is filled.

Check the CO2 cylinder is full.

***Check the needle is pushed in far enough.

IF STILL UNSATISFACTORY, REMOVE THE NEEDLE AND REINSERT

IF UNSATISFACTORY AT A SECOND PASSAGE, MAKE AN UMBILICAL OPENING FOR THE PORT UNDER DIRECT VISION.

Direct entry is to be preferred.

You will need a 2/0 Vicryl (Ethicon 9125) purse string round the port to prevent a gas leak.

If you meet adhesions, consider another site.

Consider the Boring technique using a 5mm. telescope passed down a 5mm. port. If you see muscle, bore on.

If you see white, this means adhesions, so bore the telescope to a blue part with blood vessels.

Puncture only through bluish tissue.

084 IF BLOOD FLOWS UP THE VERESS NEEDLE

Resite the needle and continue with insertion of the camera to assess the cause.

If there is an expanding swelling, make an emergency laparotomy.

085 IF THERE IS A SUDDEN COLLAPSE OF THE PATIENT

THIS USUALLY MEANS

A REACTION TO INSERTION OF CO_2

BE READY TO EMPTY THE GAS FROM THE PATIENT.

ASK ADVICE FROM THE ANAESTHETIST WHEN TO CONTINUE.

*** OR A MAJOR VESSEL INJURY

NON-INTRA ABDOMINAL CAUSES INCLUDE:

PATIENT:
MYOCARDIAL INFARCT

CARDIAC RHYTHM CHANGES

AIR WAY AND VENTILATOR

PROBLEMS

DRUG REACTION

GAS EMBOLISM

TENSION PNEUMOTHORAX

STOP INSUFFLATING

EXAMINE THE PERITONEAL CAVITY

FOR A BLEEDING OR EXPANDING HAEMATOMA:

MAKE AN EMERGENCY LAPAROTOMY

CONTROL BLEEDING

RESTORE BLOOD VOLUME

REPAIR THE CAUSE OF BLEEDING

086 REMOVE THE VERESS NEEDLE

When there is a suitable pneumoperitoneum. i.e. When there is about 4 litres of CO_2 in the peritoneum.

When the abdomen is obviously distended.

When the recorded pressure is 12mm.

When the flow stops, showing up with a fall of the ball, and a slowing of the clicks.

087 **UMBILICAL PORT INSERTION**

This is potentially much more dangerous than inserting the Veress needle

088 CHECK THE UMBILICAL TROCAR AND PORT

For a Wolf non-disposable 10mm. trocar and port.

Check the point is sharp.

Check the valve moves freely.

Check the gas tap is OFF ie. across the line of the tube.

Place the top of the trocar in the palm of your right hand.

Place your right index finger on the shaft of the trocar at the expected limit of insertion. This will prevent sudden uncontrolled overinsertion of the trocar.

089 GRASP THE SUBUMBILICAL FAT

Use your left hand to elevate and pull caudally a generous handful of abdominal wall below the umbilicus.

If your hand is not strong enough, use 2 Littlewoods forcep to elevate the subumbilical abdominal wall.

090 INSERT THE UMBILICAL TROCAR AND PORT

Push the trocar and port steadily through the umbilical wound, through the linea alba, and through the peritoneum.

Push towards the coccyx.

You will feel the trocar "give" as it enters the peritoneal cavity.

***For a disposable 10mm. Autosuture trocar and port (Surgiport): Check the gas stopcock is turned off (In line with the tubing).

Place the handle of the Surgiport in the palm of your right hand with the writing uppermost.

Sqeeze the cross piece of the Surgiport with your fingers to show up the sign "Safety Shield On".

Place your index finger on the sleeve to prevent the Surgiport penetrating deeper than the abdominal wall thickness + 1cm.

Push the Surgiport steadily through the umbilical wound, through the linea alba, and through the peritoneum.

Push towards the coccyx.

*** For insertions in the presence of adhesions or past sepsis, consider using a 5mm. port with a 5mm. telescope initially, in a safe site.

Pull on the white cube.
Once you have confirmed the satisfactory placing of the 5mm. port, replace it as needed with the standard 10mm. port to revert to a normal procedure.

091 PULL OUT THE TROCAR

092 TEST THE PORT IS IN THE PERITONEUM

Squeeze momentarily on the valve to release a hiss of CO_2.

*** On a Surgiport, flip momentarily the tap on the top of the Surgiport to get the hiss.

If there is no hiss, replace the trocar and push the port further in.

If there is still no hiss, insert the telescope for a direct examination.

Consider an open dissection of the port opening.

093 FIT THE INSUFFLATOR TUBING TO THE PORT

094 OPEN THE PORT GAS TAP

095 SWITCH THE CO2 FLOW TO 1 LITRE FIXED

096 SWITCH THE CO2 FLOW TO 4 LITRES FIXED

097 SWITCH THE CO2 FLOW TO 4 LITRES AUTOMATIC

098 IF THERE IS A LOSS OF PNEUMOPERITONEU M:

CHECK FOR A FALL IN CO2 SUPPLY: i.e. Low flow on the flow ball.

Check the reserve tank is not empty.

Check the CO2 bottle is not empty.

Check the insufflator tubing is not kinked.

Check a gas tap has not been closed by mistake.

CHECK FOR AN EXCESS LOSS OF CO_2. i.e. High flow on the flow ball.

Check the port has not slipped out of the peritoneum. Push the port back into the peritoneal cavity, and hold it there by hand.

If there is any difficulty in pushing the port back in, replace it formally using the trocar.

For a loose port which is leaking, slipping in or out, insert a disposable bung.

Check insufflator tubing has not fallen of the port.

Check excess use of suction.

Check loose converter.

Check loss of converter rubber seal.

Later in the operation, check for leaking gas tap on any port.

098 START THE VIDEO

099 **UMBILICAL CAMERA INSERTION**

100 INSERT THE CAMERA DOWN THE UMBILICAL PORT

Wipe the opening of the port to remove any blood droplets.

Open the valve before the camera hits it to prevent blood staining the lens.

101 **CAMERA HANDLING**

102 TOUCH THE PERITONEUM WITH THE CAMERA

This will warm the lens and prevent misting.

103 CHECK THE PICTURE

If there is no picture, clean the lens.

If there is still no picture, suspect an omental flap, or the port has slipped out of the peritoneum.

Remove the telescope.

Push the port in further and test for a CO_2 hiss.

Put the telescope back in the port.

If the picture is still not clear, remove the telescope and port.

Consider another site for the camera port.

Remove CO_2 tubing to another port.

104 IF THERE IS A HAZY PICTURE:

Clean the lens again.

Clean the top of the port.

Check the focus.

Warm the telescope in water at 37 degrees.

Check the camera and laparoscope ends are dry.

If still not clear, rub the lens vigorously with a gauze to remove any fatty deposit on the lens.

Remove CO2 tubing to another port.

Check the colour/brightness.

Check the signal output is adjusted.

105 IF THERE IS A GOOD PICTURE

CONTINUE

106 CHECK FOR DAMAGE BY NEEDLE OR TROCAR

Look all around the peritoneal cavity (360 degrees).

Minor bruises and scratches on the viscera -ignore.

Moderate bleeding
- use diathermy.

Major bleeding
- use Ligaclips or ligatures

Simple perforation of bowel
- treat expectantly.

Tears or complete tranfixion of bowel by the trocar and port
- open laparotomy and repair/ resection.

Bladder perforation
- Foley catheter for 7 days.

A bleeding or expanding haematoma
- open laparotomy and control the bleeding.

Insufflation of preperitoneal, retroperitoneal, omental, mesenteric or falciform ligament tissues
- Ignore

Choose another site for insertion of the port if necessary, and wait for the CO_2 to absorb.

107 EXAMINE THE LOWER ABDOMEN AND PELVIS FOR OTHER PATHOLOGY

Treat other pathology on its own merits.

108 EXAMINE THE UPPER ABDOMEN

Check that the epigastric port site is free from adhesions. This site is to the right of the falciform ligament, 2cm. below the lower margin of the liver.

If there are adhesions, choose a site clear of the adhesions. (Use the 5mm. trocar and telescope if available).

109 **EPIGASTRIC OPERATING PORT INSERTION**

110 CHOOSE AN EPIGASTRIC PORT SITE

This will be through the peritoneum
2cm. to the right of the falciform ligament,

2cm. below the xiphisternum,
2cm. below the lower margin of the liver.

111 SURFACE MARK THE EPIGASTRIC PORT SITE

Tap on the skin to movement of the correct part of the underlying peritoneum.

Make sure the site is not in, or to the left of the falciform ligament.

Transilluminate the abdominal wall with the camera end to show up any blood vessels in the wall. Avoid them.

112 INCISE THE SKIN

Use a no 15 Swann-Morton scalpel.

Make a 15mm. transverse incision (ie. pi x the radius of the 10mm. port for a gas tight fit)

Cut through the skin only, to avoid incising damaging subcutaneous blood vessels.

113 CHECK THE EPIGASTRIC TROCAR AND PORT

For a Wolf non-disposable 10mm. trocar and port:

Check the point is sharp.

Check the valve moves freely.

Check the gas tap is OFF ie.across the line of the tube.

Place the top of the trocar in the palm of your right hand.

Place your right index finger on the shaft of the trocar at the expected limit of insertion. This will prevent

sudden uncontrolled overinsertion of the trocar.

114 INSERT THE EPIGASTRIC TROCAR AND PORT

Keep a protecting index finger on the outside of the port.

Push the trocar and port steadily through the epigastric tissues.

Point the trocar towards the gallbladder area. This will lessen the sideways friction on the insulation of the hook electrode later.

You will see the inner abdominal wall bulging down as you push. Check that it is to the right of the falciform ligament, away from adhesions.

As you push, you will see the tip of the trocar appear in the summit of the abdominal wall bulge.

If the point catches in the falciform ligament, or is to the left of it, remove the trocar and reinsert in the correct place.

The insufflator pressure alarm may sound as you push. It is not important at this moment.

Keep pushing until the trocar and the first 1cm. of the port appear in the abdomen. A twisting motion is helpful as well as a straight push.

Make sure the trocar and port do not suddenly rush into the abdominal cavity and damage the viscera.

***For a disposable 10mm. Autosuture trocar and port (Surgiport): Check the

gas stopcock is turned off (In line with the tubing).

Place the handle of the Surgiport in the palm of your hand with the writing uppermost.

Sqeeze the cross piece of the Surgiport with your fingers to show up the sign "Safety Shield On".

Place your index finger on the sleeve to prevent the Surgiport penetrating deeper than the abdominal wall thickness + 1cm.

Push the Surgiport steadily through the epigastric tissues.

Point the trocar towards the gallbladder area. This will lessen the sideways friction on the insulation of the hook electrode later.

You will see the inner abdominal wall bulging down as you push. Check that the bulge is to the right of the falciform ligament, away from adhesions.

As you push, you will see the tip of the trocar appear in the summit of the abdominal wall bulge.

If the point catches in the falciform ligament, or is to the left of it, remove the trocar and reinsert in the correct place.

The insufflator pressure alarm may sound as you push. It is not important at this moment.

Keep pushing until the trocar and the first 1cm. of the port appear in the abdomen. A twisting motion will not help

because the shaft of the trocar will simply rotate independently of the trocar point.

Make sure the trocar and port do not suddenly rush into the abdominal cavity and damage the viscera.

The safety guard will spring forward to protect the viscera from accidental damage, but it is not infallible.

*** For insertions in the presence of adhesions or past sepsis, consider using a 5mm. port with a 5mm. telescope initially, in a safe site.

?Pull on the white cube.
Once you have confirmed the satisfactory placing of the 5mm. port, replace it as needed with the standard 10mm. port to revert to a normal procedure.

115 PULL OUT THE TROCAR

116 IF THERE IS BLEEDING/ HAEMATOMA FROM THE EPIGASTRIC VESSELS

eg. Blood dripping down the outside of the port into the peritoneum.

Do not remove the trocar and port.

For a haematoma only, insert deep sutures through the abdominal wall cranially and caudally.

Use a suture introducer.

If moderate bleeding, coagulate the peritoneum cranial and caudal to the port to control the epigastric vessels.

If severe bleeding, incise the anterior abdominal wall to clamp and suture the ends of the bleeding vessels.

*** Check bleeding has stopped.

117 INSERT A 5MM. REDUCING SLEEVE

Use a non-disposable metal sleeve with a blue rubber cap.

Push the reducing sleeve 2cm. into the 10mm. port.

Press in the piston on the 10mm. port.

Push the reducing sleeve right into the 10mm. port.

Keep a finger on the port to prevent a gas escape.

118 INSERT THE HOOK ELECTRODE

119 EXAMINE THE UPPER ABDOMEN

Use the hook as a probe.

120 CHECK FOR DAMAGE BY THE TROCARS AND VERESS NEEDLE

121 **ADHESION DIVISION**

These will be adhesions in the abdomen from earlier operations or from the effects of the gallbladder disease.

At this stage, you only need to free adhesions to allow insertion of the lateral 2 ports, and to gain access to the gallbladder.

Use the hook electrode.

Sweep through thin adhesions with the hook. Thin adhesions show up black. Thick adhesions show up white.

Cut the thicker adhesions using coagulation current with the hook. Check the adhesion does not contain viscera such as small and large bowel, or gallbladder.

If the hook does not coagulate:

Check the lead has not fallen off the hook handle.

Check if the blue plug on the diathermy machine needs to be removed.

Check the monopolar light is shining on the diathermy control panel.

IMPORTANT: the electrode remains dangerously hot for 30 seconds or more after coagulation. Make sure you do not let the hot electrode touch the viscera during this time. This may happen when the hook is out of the operating field or field of view.

Dissect the right side of the peritoneum.

The dissection will free the peritoneum for insertion of the 2 lateral ports.

Only free as much adhesion tissue as is needed for a clear view of the port sites.

Cut the adhesions at their junctions with the peritoneum.

Avoid cutting the omental fat which will bleed.

122 **SUBCOSTAL PORT INSERTION**

123 CHOOSE A SUBCOSTAL PORT SITE

2cm. below the costal margin 10cm. lateral to the epigastric port.

Tap the skin to check the underlying peritoneum is clear of adhesions.

Transilluminate the abdominal wall to avoid vessels.

124 INCISE THE SKIN

Use a no 15 Swann - Morton scalpel.

Make a 7mm. transverse incision (ie. pi x the radius of the 5mm. port for a gas tight fit)

Cut through the skin only to avoid incising damaging subcutaneous blood vessels.

125 CHECK THE SUBCOSTAL TROCAR AND PORT

For a Wolf non-disposable 5mm. trocar and port.

Check the point is sharp.

Check the valve moves freely.

Check the gas tap is OFF ie. across the line of the tube.

Place the top of the trocar in the palm of your right hand.

Place your right index finger on the shaft of the trocar at the expected limit of insertion. This will prevent sudden uncontrolled overinsertion of the trocar.

126 INSERT THE SUBCOSTAL TROCAR AND PORT

Keep the protecting index finger on the outside of the port.

Push the trocar and port steadily through the abdominal wall.

Point the trocar towards the gallbladder area. This will lessen the sideways friction on spoons forcep later.

Make sure the trocar and port do not suddenly rush into the abdominal cavity and damage the viscera.

You will see the inner abdominal wall bulging down as you push. Check that it is away from adhesions and viscera.

As you push, you will see the tip of the trocar appear in the summit of the abdominal wall bulge.

If the point is in danger of damaging adhesions or viscera, remove the trocar and reinsert in a better place.

The insufflator pressure alarm may sound as you push. It is not important at this moment.

Keep pushing until the trocar and the first 1cm. of the port appear in the abdomen. A twisting motion is helpful as well as a straight push.

***For a disposable 5mm. Autosuture trocar and port (Surgiport):

Check the gas stopcock is turned off (In line with the tubing).

Place the handle of the Surgiport in the palm of your right hand with the writing uppermost.

Sqeeze the cross piece of the Surgiport with your fingers to show up the sign "Safety Shield On".

Place your right index finger on the sleeve to prevent the Surgiport penetrating deeper than the abdominal wall thickness + 1cm.

Push the Surgiport steadily through the abdominal wall.

Point the trocar towards the gallbladder area. This will lessen the sideways friction on the spoons forcep later.

You will see the inner abdominal wall bulging down as you push. Check that the bulge is away from adhesions and viscera.

As you push, you will see the tip of the trocar appear in the summit of the abdominal wall bulge.

The insufflator pressure alarm may sound as you push. It is not important at this moment.

Keep pushing until the trocar and the first 1cm. of the port appear in the abdomen. A twisting motion will not help because the shaft of the trocar will simply rotate independently of the trocar point.

If the point in is danger of damaging adhesions or viscera, remove the trocar and reinsert in a better place.

127 **ILIAC PORT INSERTION**

128 CHOOSE THE ILIAC PORT SITE

5cm. above the anterior superior iliac spine in the mid axillary line.

This should be in line with the subcostal and the epigastric ports.

Tap the skin to check the underlying peritoneum is clear of adhesions.

Transilluminate the abdominal wall to avoid vessels.

129 INCISE THE SKIN

Use a no 15 Swann - Morton scalpel.

Make a 7mm. transverse incision (ie. pi x the radius of the 5mm. port for a gas tight fit)

Cut through the skin only to avoid incising damaging subcutaneous blood vessels.

130 CHECK THE ILIAC TROCAR AND PORT

For a Wolf non-disposable 5mm. trocar and port.

Check the point is sharp.

Check the valve moves freely.

Check the gas tap is OFF ie. across the line of the tube.

Place the top of the trocar in the palm of your LEFT hand.

Place your LEFT index finger on the shaft of the trocar at the expected limit of insertion. This will prevent sudden uncontrolled overinsertion of the trocar.

131 INSERT THE ILIAC TROCAR AND PORT

Keep the protecting index finger on the outside of the port.
Point the trocar towards the gallbladder area. This will lessen the sideways friction on the beaks forcep later.

Push the trocar and port steadily through the abdominal wall.

Make sure the trocar and port do not suddenly rush into the abdominal cavity and damage the viscera.

You will see the inner abdominal wall bulging down as you push. Check that it is away from adhesions and viscera.

As you push, you will see the tip of the trocar appear in the summit of the abdominal wall bulge.

If the point is in danger of damaging adhesions or viscera, remove the trocar and reinsert in a better place.

The insufflator pressure alarm may sound as you push. It is not important at this moment.

Keep pushing until the trocar and the first 1cm. of the port appear in the abdomen. A twisting motion is helpful as well as a straight push.

***For a disposable 5mm. Autosuture trocar and port (Surgiport):

Check the gas stopcock is turned off (In line with the tubing).

Place the handle of the Surgiport in the palm of your LEFT hand with the writing uppermost.

Sqeeze the cross piece of the Surgiport with your fingers to show up the sign "Safety Shield On".

Place your LEFT index finger on the sleeve to prevent the Surgiport penetrating deeper than the abdominal wall thickness + 1cm.

Point the trocar towards the gallbladder area. This will lessen the sideways friction on the beaks forcep later.

Push the Surgiport steadily through the abdominal wall.

Make sure the trocar and port do not suddenly rush into the abdominal cavity and damage the viscera.

You will see the inner abdominal wall bulging down as you push. Check that the bulge is away from adhesions and viscera.

As you push, you will see the tip of the trocar appear in the summit of the abdominal wall bulge.

The insufflator pressure alarm may sound as you push. It is not important at this moment.

If the point in is danger of damaging adhesions or viscera, remove the trocar and reinsert in a better place.

Keep pushing until the trocar and the first 1cm. of the port appear in the abdomen. A twisting motion will not help because the shaft of the trocar will simply rotate independently of the trocar point.

132 INSPECT THE ABDOMINAL CONTENTS

Empty the stomach with a naso-gastric tube if it is getting in the operating field.

Tilt the operating table to the left and foot down as needed to get the clearest view.

Push omentum and colon downwards, out of the field of view with the hook electrode.

133 CHECK FOR INSTRUMENTAL DAMAGE

Look all around the upper abdominal cavity.

Minor bruises and scratches on the viscera -ignore.

Moderate bleeding
- use diathermy.

Major bleeding
- use Ligaclips or ligatures

Simple perforation of bowel
- treat expectantly.

Tears or complete tranfixion of bowel by the trocar and port
- open laparotomy and repair/ resection.

Bladder perforation
- Foley catheter for 7 days.

A bleeding or expanding haematoma
- open laparotomy and control the bleeding.

Insufflation of preperitoneal, retroperitoneal, omental, mesenteric or falciform ligament tissues
- Ignore

Choose another site for insertion of the port if necessary, and wait for the CO_2 to absorb.

134 CHECK FOR OTHER PATHOLOGY

Treat these conditions on their merits.

Do not hesitate to perform a laparotomy if indicated.

135 CHECK ILLUMINATION

136 CHECK CLEAR LENS

137 CHECK FOCUS FOCUS

138 CHECK FOR GAS LEAKS

139 **GALLBLADDER FUNDUS RETRACTION**

140 PASS THE SPOONS FORCEP THROUGH THE SUBCOSTAL PORT

141 PASS THE BEAKS FORCEP THROUGH THE ILIAC PORT

Check the ratchet on the beaks handle catches properly. You may need to

bend the the ratchet spur slightly to make proper contact with the opposite handle.

Hold the forcep in your left hand.

As with all forceps, push the jaws completely through the port, or they will not open.

Locate the jaws of the forcep on the monitor.

Pull the end of the iliac port out of view to prevent glaring.

If the port slides into view as you use the forcep, pull it out of view. Or use a nondisposable port with a collar if it is troublesome.

142 HOLD THE HOOK ELECTRODE

Use your right hand.

Locate the hook on the monitor.

Pull the end of the subcostal port out of view to prevent glaring.

143 FIND THE GALLBLADDER

Point the camera towards the liver edge.

The fundus of the gallbladder will be visible in 80% of cases as a blue or white swelling about 5cm. in diameter under the middle of the liver edge.

The fundus may be covered with omentum.

Use the hook electrode to sweep the omentum away.

More tilt of the patient to the left and foot down will help.

The fundus may be covered by adherent omentum, and small and large bowel.

These will need to be cleared away to make the fundus accessible for grasping and elevation.

Use a combination of sweeping and coagulation with the hook.

Pull the hooked tissue towards the camera as you coagulate, to prevent coagulation damage to the bowel wall and liver.

Hold the tissues taut with the spoon forcep to assist dissection.

IMPORTANT:

The hook electrode remains dangerously hot for 30 seconds or more after coagulation.

Make sure you do not let the hot electrode touch the viscera during this time.

This may happen when the hook is out of the operating field or field of view.

In severe cases, there may be localised abscess or fistula formation into nearby bowel.

Convert to an open operation.

The gallbladder may be intrahepatic.

Convert to an open operation.

144 GRASP THE FUNDUS OF THE GALLBLADDER

Slide the open beaks forcep down the gallbladder from its body to the fundus to get a satisfactory grip.

If the gallbladder is too distended for easy grasping:

> Aspirate it with an aspirating needle passed through the subcostal port.
>
> Puncture the fundus where it will be held by the beaks forcep to prevent further spillage.
>
> Close any unsuitable puncture site or accidental opening with an Endoloop.

If the fundus is still too thickened for grasping:

> Wait for the gallbladder to be freed by later dissection before grasping the fundus.

Elevate the gallbladder temporarily with a closed beak forcep for access.

If the gallbladder is fibrosed and shrunken: Consider a trial dissection.

Stop if the cystic duct is very thick (more than 15mm).

Stop if the anatomy is not clear. i.e. Calot's triangle is not visible.

(Cystic duct runs west, the commom bile duct runs north).

> Consider an open cholecystectomy.

145 ELEVATE THE FUNDUS OF THE GALLBLADDER UP TOWARDS THE DIAPHRAGM

This is a very important step in making exposure easy.

Use the beaks grasping forcep.

Get the 2nd assistant or scrub nurse to maintain a firm upward traction on the fundus to assist further dissection.

The gallbladder should lie north/south.

Increase the elevation as the gallbladder is freed in the next part of the operation.

146 GALLBLADDER DISSECTION

Your aim is to have the gallbladder clearly visible down to Hartmann's pouch.

If there are no adhesions:
    GO TO HARTMANN'S POUCH RETRACTION (OPSTEP 147)

If there are adhesions:
    Sweep them off, or cut them with the hook electrode.

If the adhesions are very dense:
    Slow down and dissect extra carefully.

If adhesions are too dense:
    Convert to an open operation.

If you cannot define the anatomy:
    Slow down and dissect extra carefully.

If anatomy is still not clear:
Convert to an open operation.

If you find or suspect an abscess or a bowel fistula:
Convert to an open operation.

147 HARTMANN'S POUCH RETRACTION

You are now moving to tissues which require more dissection. The tissues are also more important, and more easily damaged.

Hartmann's pouch is less often clearly visible than the fundus. It may be obscured by fat as well as being covered by adhesions.

If Hartmann's pouch is visible and mobile:
Grasp it with the spoons forcep.

Take as big a bite as you can.

Push the forcep onto the pouch as you close the jaws, to prevent the jaws retracting up the port.

Pull Hartmann's pouch out towards the patient's right (to the west).

The forcep is designed to slip before the tissue tears.

You may need to reposition the jaws from time to time.

If there are adhesions on Hartmann's pouch:
Sweep them off, or cut them with the hook electrode.

If the adhesions are very dense:
Slow down and dissect extra carefully.

Convert to an open operation.

If you cannot define the anatomy:
Slow down and dissect extra carefully.
Convert to an open operation.

If there is a stone impacted in Hartmann's pouch:
Try pushing the stone and Hartmann's pouch laterally with half open racquet forcep to display the cystic duct.

Consider cutting down onto the stone with scissors and removing it.

If Hartmann's pouch is adherent to the common bile duct area:
Convert to an open operation.

Take your time.

It may take up to an hour.

Concentrate on the junction between the gallbladder and the adhesions.

Beware a hot electrode.

148 CYSTIC DUCT AND ARTERY DISSECTION

You are now coming to the crux of the operation.

You must:
Know the likely variants.

Be 100% certain of the patient's anatomy.

Have a 100% correct dissection.

Be able to deal with the unexpected.

Be ready to convert to an open operation.

149 DISPLAY THE CYSTIC DUCT/ARTERY AREA

The cystic duct and artery will lie to the left of the dissection of Hartmann's pouch.

It is unlikely that you will be able to see either structure at this stage.They will be covered by peritoneum, subperitoneal fat, and adhesions.

The cystic artery may be absent.

The gallbladder may join directly onto the common bile duct or a hepatic duct.

Check the camera is vertical.

Zoom the camera in, to ride over the mound of omentum and transverse colon.

Slide the camera under an enlarged right lobe of liver to act as a retractor.

Check the fundus is held firmly up towards the diaphragm by the beak forcep.

Check the spoons forcep is pulling Hartmann's pouch to the patient's right.

Roll the patient more to the left and more foot down if needed.

Check there are no residual adhesions holding the gallbladder in the wrong place.

Pull on the peritoneum and adventitia around the cystic artery and duct so that they form strands for easier dissection.

150 START DISSECTING THE CYSTIC DUCT AND ARTERY AREA

This dissection will be more difficult than division of adhesions.

Take your time.

It may take 3 minutes, or up to an hour.

Use the spoons forcep in your left hand to display the tissues.

Make large movements with your left hand to swing the gallbladder from side to side. You will be displaying the tissues to the right of the gallbladder, unlike in an open operation.

Hold the hook electrode between your right index and thumb to dissect.

Make very small, delicate movements with the hook. ie.Sweeping, rotating, hooking, coagulating.

Coagulate strands of tissue no more than than 0.5mm. in diameter. These will be adventitia, fibrous bands, lymph vessels, nerve fibres, fat, and small blood vessels.

To coagulate, hook the strand, elevate it to stretch it out, and coagulate/cut using less than 2 seconds of coagulation.

If you suspect a strand is a minor blood vessel, char it in 2 places 5mm. apart before coagulation/cutting it at its gallbladder end.

151 FINDING THE CYSTIC DUCT

You will not be certain of the anatomy at this point.

Expect the anatomy to emerge as you dissect.

You will probably find the cystic duct first, but a prominent artery (a hepatic artery perhaps) may come into view first.

Open the peritoneum.

Start where Hartmann's pouch has been dissected.

Dissect TOWARDS the cystic duct and artery area.

Do not start the dissection in the cystic duct/artery area.

You may be dissecting the common bile duct by mistake.

Cut the peritoneum towards the liver on the left of Hartmann's pouch.

Cut the peritoneum towards the liver behind Hartmann's pouch.

Extend the dissection along the posterior and anterior sides of the gallbladder 2mm. from the liver to get better access.

The cystic duct will probably appear before the cystic artery.

This will be in the lower margin of the tissues being dissected.

It will look at first like a thickening in the fatty adventitia.

As you pick off strands of tissue, its duct shape and whitish colour will emerge. .

It will be 2 -10mm. in diameter and up to 25mm.long, running east/west.

Be suspicious of a "cystic duct" more than 8mm. diameter or more than 20mm. long, or running to the north.

Coagulation/dissection of any duct may damage it. A cystic duct will be removed. A dissected common bile duct has to stay, and may fibrose.

Stop dissecting:

When you have skeletalised 20mm. of duct. And there is enough space behind the duct for the jaws of the clip applier.

Run the hook electrode up and down behind the cystic duct to make sure that it is completely free.

Continue the operation.

If the cystic duct widens out with tenting of the common bile duct. And there is enough space behind the duct for the jaws of the clip applier.

Run the hook electrode up and down behind the

cystic duct to make sure that it is completely free.

Continue the operation.

If the length of cleared cystic duct is less than 20mm.

Continue the operation.

Consider converting to an open operation.

When there is too much fibrosis for safe dissection.

Convert to an open operation.

If you do not know where you are.

Convert to an open operation.

Common variants include:

Tented common bile duct.

Distended cystic duct resembling a common bile duct.

Neck of the gallbladder resembling a distended cystic duct.

Long cystic duct running down alongside the common bile duct.

Very short (or zero) cystic duct.

152 FINDING THE CYSTIC ARTERY

The cystic artery, or its branches, usually runs parallel to the cystic duct.

It lies more deeply, in the fatty adventitia to the left of the duct.

It is pinker and more rounded than the duct.

It does not pulsate as the right hepatic artery does.

It may be absent, thrombosed, or lie deeply behind the cystic duct.

Its function may be taken over by large vessels running directly into the gallbladder from the gallbladder bed.

It is much more fragile than the cystic duct.

It has an unfortunate tendency to bleed during dissection. Minor oozing will stop by itself.

It may arise from a loop of right hepatic artery behind the cystic duct.

It may have the right hepatic duct running parallel and deep to it.

Consider any artery to be a branch until it proves to be solitary

Once you have identified the artery, dissect it towards the gall bladder to clear 20mm. Dissecting towards the right hepatic artery is more dangerous.

Stop dissecting:

When you have skeletalised 20mm. of cystic artery. And there is enough space behind the artery for the jaws of the clip applier.

Run the hook electrode up and down behind the cystic artery to make sure that it is completely free.

Continue the operation.

If the length of cleared cystic artery is less than 20mm.

Continue the operation.

Consider converting to an open operation.

When you cannot find an artery.

Check you have interpreted the anatomy correctly.

You may have mistaken the common bile duct for the cystic duct.

Cut and clip the cystic duct as below. Look again for the artery.

When there is too much fibrosis for safe dissection.

Convert to an open operation.

If you do not know where you are.

Convert to an open operation.

Common variants include:

More than 1 cystic artery.

Branching cystic artery.

Absent cystic artery.

Right hepatic artery mimicking the cystic artery.

Aberrant cystic artery running across the cystic duct from the gastro-duodenal artery.

153 DEALING WITH BLEEDING

Don't panic.

The camera magnifies the bleeding alarmingly.

Try local pressure with the hook electrode.

Use pressure with a pledget held in a racquet diathermy forcep.

Connect the diathermy forcep to the diathermy machine.

Put the suction/irrigator in the subcostal port.

Put the diathermy forcep in the epigastric port.

Grasp a 1-2mm. vessel precisely with forcep and coagulate it.

Grasp a larger vessel with the forcep and wait for 3 minutes to allow spontaneous coagulation.

Dissect out a vessel held in the forcep to allow clipping.

Wait 10 minutes before deciding on an open operation.

For uncontrollable bleeding, do a laparotomy.

154 **CYSTIC ARTERY CLIPPING (IF PRESENT)**

155 CHECK THE CYSTIC ARTERY DIAMETER

If the artery is 4mm. or less (90% of cases), use 300 Ligaclips.

If the artery is more than 4mm., check it really is the cystic artery.

For a cystic artery more than 4mm., use an extra large 400 Ligaclips or an Endoloop.

156 TAKE OUT THE HOOK ELECTRODE

157 TAKE OUT THE 5MM. REDUCING SLEEVE

158 CHECK THE CLIP APPLIER

Check it is a Wolf 8389 801 non-disposable medium Ligaclip applier.

Check the jaw rotation friction nut at the trigger level of the applier is fully tightened.

It may be fully loosened, and paradoxically, feel as if it is tightened.

If the jaws rotate and the instrument rattles on shaking, retighten the nut vigorously.

Check it is loaded with a 300 Ligaclip.

(FOR A DISPOSABLE CLIP APPLIER Check it is an Autosuture Endoclip ML Disposable Applier with Medium-Large Titanium clips.

Check the clips are present.

Test load 1 clip.

Test fire 1 clip.

Remove the fired clip.

Check the jaws rotate easily.)

159 CHECK THE SCISSORS

Check they are the Wolf hooked scissors with single action blade (8383-45)

Check the scissors will cut an arterial sloop.

Check you have a spare pair of disposable scissors (Endoshears).

60 INSERT THE CLIP APPLIER

In the epigastric port.

Manoeuvre the jaws into the operating area.

161 TEST THE DISSECTION OF THE CYSTIC ARTERY

Place the jaws of the applier at the 2 planned sites for clipping, 20mm.apart on the artery.

Rotate the jaws to get the neatest siting of the applier.

If you do not have a clear view of the back of the back jaw, dissect some more strands with the hook electrode.

If there is less than 20mm. clear cystic artery:

> Consider putting 2 clips on the origin of the artery and coagulating the gallbladder end of the artery.
>
> Consider converting to an open operation.

162 PUT THE FIRST CLIP ON THE CYSTIC ARTERY

This is the first of 3 clips on the artery.

(FOR A DISPOSABLE APPLIER Hold the applier 5mm. from the artery.

Load the applier by pressing the loading button on the applier handle.

Check a clip loads into the jaws.)

163 FIT THE JAWS ON THE CYSTIC ARTERY

Choose the most distal site from the hepatic artery.

Rotate the jaws for the best angle.

Make sure you do not rub the clip out of position in the jaws.

Check the posterior jaw is clearly visible.

164 CLIP THE ARTERY

Close the jaws smoothly and slowly by steadily squeezing the handles of the applier as hard as you can.

Use a 2 hand squeeze.

Avoid any jerking movement.

Release the handles gently.

Carefully withdraw the jaws from the clipping zone.

165 CHECK THE FIRST CLIP

Check it is:

At the correct site.

At exactly 90 degrees to the cystic artery.

Projecting 1mm. at least beyond the artery.

Not attached to any other structure.

If the clip has fallen off:
Ignore it and start the clipping afresh.

If the clip is loose: or does not extend completely across the artery:

or is lying obliquely:

Start clipping afresh, distal to the unsatisfactory clip.

Do not place 1 clip on top of another.

Do not try to fit 2 clips end to end across a wide vessel.

If the applier is stiff in the port, lubricate it with saline.

Use a disposable port if a non-disposable port is causing serious sticking.

166 RELOAD THE NON-DISPOSABLE CLIP APPLIER

(For a disposable applier GO TO OPSTEP 170 (PUT THE SECOND CLIP ON THE CYSTIC ARTERY))

167 WITHDRAW THE CLIP APPLIER

168 FIT A NEW CLIP ONTO THE APPLIER

Keep hold of the applier handle.

Push the jaws firmly onto the next clip in the rack, guided by the scrub nurse.

Check the clip is firmly held by the jaws.

169 INSERT THE CLIP APPLIER

170 PUT THE SECOND CLIP ON THE CYSTIC ARTERY

Use the same technique as for the first clip.

Place it on the artery 20mm. from the first clip on the hepatic artery side of the artery.

Manage clipping problems as for the first clip.

171 CHECK THE SECOND CLIP

Check it is:

At the correct site.

At exactly 90 degrees to the cystic artery.

Projecting 1mm. at least beyond the artery.

Not attached to any other structure.

If the clip has fallen off:

Ignore it and start the clipping afresh.

If the clip is loose,

or does not extend completely across the artery.

or is lying obliquely:

Start clipping afresh, distal to the unsatisfactory clip.

Do not place 1 clip on top of another.

Do not try to fit 2 clips end to end across a wide vessel.

If the applier is stiff in the port, lubricate it with saline.

Use a disposable port if a non-disposable port is causing serious sticking.

172 PUT THE THIRD CLIP ON THE CYSTIC ARTERY

Use the same technique as for the first clip.

Place it on the artery adjacent to the second clip on the gallbladder side of the artery.

Check it does not overlie the second clip.

If there is not 15mm. of artery free, dissect out the artery more fully distally.

Manage clipping problems as for the first clip.

173 CHECK THE THIRD CLIP

Check it is:

At the correct site.

At exactly 90 degrees to the cystic artery.

Projecting 1mm. at least beyond the artery.

Not attached to any other structure.

If the clip has fallen off:

Ignore it and start the clipping afresh.

If the clip is loose,

or does not extend completely across the artery,

or is lying obliquely:
Start clipping afresh, distal to the unsatisfactory clip.

Do not place 1 clip on top of another.

Do not try to fit 2 clips end to end across a wide vessel.

If the applier is stiff in the port, lubricate it with saline.

Use a disposable port if a non-disposable port is causing serious sticking.

174 **CYSTIC DUCT CLIPPING**

175 CHECK THE CYSTIC DUCT DIAMETER

If the duct is 4mm. or less (90% of cases), use 300 Ligaclip clips.

If the duct is more than 4mm. in diameter, check by further dissection, that it is not, in fact, the neck of the gallbladder or the common bile duct.

For a cystic duct more than 4mm., use an extra large 400 Ligaclip with the corresponding extra large clip applier. Or use a large Absulok, or an Endoloop.

Consider an Endo GIA 30-3.5 stapler via a 12mm. port.

Consider crushing the duct with empty clip applier jaws. This will allow a clip to fit more easily.

176 LOAD THE CLIP APPLIER

(FOR A DISPOSABLE APPLIER Hold the applier 5mm. from the duct.

Load the applier by pressing the loading button on the applier handle.

Check a clip loads into the jaws.)

177 FIT THE JAWS ON THE CYSTIC DUCT

Choose a clear site on the gallbladder end of the cystic duct, out of any danger of the common bile duct.

Rotate the jaws for the best angle.

Make sure you do not rub the clip out of position in the jaws.

Check the posterior jaw is clearly visible.

178 PUT THE FIRST CLIP ON THE CYSTIC DUCT

Close the jaws smoothly and slowly by steadily squeezing the handles of the applier as hard as you can.

Use a 2 hand squeeze.

Avoid any jerking movement.

Release the handles gently.

Carefully withdraw the jaws from the clipping zone.

179 CHECK THE FIRST CLIP

Check it is: At the correct site.

At exactly 90 degrees to the cystic duct.

Projecting 1mm. at least beyond the duct.

Not attached to any other structure.

If the clip has fallen off: Ignore it and start the clipping afresh.

If the clip is loose: or does not extend completely across the duct:

or is lying obliquely:

Start clipping afresh, on the gallbladder side of the unsatisfactory clip.

Do not place 1 clip on top of another.

Do not try to fit 2 clips end to end across a wide vessel.

If the applier is stiff in the port, lubricate it with saline.

Use a disposable port if a non-disposable port is causing serious sticking.

180 RELOAD THE NON-DISPOSABLE CLIP APPLIER

(For a disposable applier GO TO STEP 255 (PUT THE SECOND CLIP ON THE DUCT))

181 WITHDRAW THE CLIP APPLIER

182 FIT A NEW CLIP ONTO THE APPLIER

Keep hold of the applier handle.

Push the jaws firmly onto the next clip in the rack guided by the scrub nurse.

Check the clip is firmly held by the jaws.

183 INSERT THE CLIP APPLIER

184 PUT THE SECOND CLIP ON THE CYSTIC DUCT

THIS IS PROBABLY THE MOST DANGEROUS MOMENT IN THE OPERATION.

Clipping the common bile duct is 5 times more common laparoscopically than at open operation. If you are in any doubt about the anatomy, convert to an open operation

Use the same technique as for the first clip.

Place the clip on the duct 20mm. from the first clip. No closer than 2mm. to the

common bile duct, or any widening of the cystic duct.

Manage clipping problems as for the first clip.

185 CHECK THE SECOND CLIP

Check it is:

At the correct site.

At exactly 90 degrees to the cystic duct.

Projecting 1mm. at least beyond the duct.

Not attached to any other structure.

If the clip has fallen off:

Ignore it and start the clipping afresh.

If the clip is loose: or does not extend completely across the duct:

or is lying obliquely:

Start clipping afresh, distal to the unsatisfactory clip.

Do not place 1 clip on top of another.

Do not try to fit 2 clips end to end across a wide duct.

If the applier is stiff in the port, lubricate it with saline.

Use a disposable port if a non-disposable port is causing serious sticking.

186 PUT THE THIRD CLIP ON THE CYSTIC DUCT

Use the same technique as for the first clip.

Place the clip on the duct adjacent to the second, on the gallbladder side of the duct.

If there is not 15mm. of duct free, dissect out the duct more fully.

Manage clipping problems as for the first clip.

7 CHECK THE THIRD CLIP

Check it is:

At the correct site.

At exactly 90 degrees to the cystic duct.

Projecting 1mm. at least beyond the duct.

Not attached to any other structure.

If the clip has fallen off:

Ignore it and start the clipping afresh.

If the clip is loose: or does not extend completely across the duct:

or is lying obliquely:

Start clipping afresh, distal to the unsatisfactory clip.

Do not place 1 clip on top of another.

Do not try to fit 2 clips end to end across a wide duct.

If the applier is stiff in the port, lubricate it with saline.

Use a disposable port if a non-disposable port is causing serious sticking.

188 **CYSTIC ARTERY CUTTING**

189 **ALWAYS CUT THE ARTERY BEFORE CUTTING THE DUCT

This will prevent the artery tearing.

If you have not found a cystic artery, be prepared to find one (or more) when dissecting the gallbladder later. GO TO OPSTEP 196 (CYSTIC DUCT CUTTING)

190 TAKE OUT THE CLIP APPLIER

191 INSERT A 5MM. REDUCING SLEEVE

Put a finger over the port end to prevent gas loss.

192 INSERT THE SCISSORS

193 POSITION THE SCISSORS

Place the scissors across the cystic artery between the single and the double clips.

Place the non-moving scissor jaw behind the artery.

Manoeuvre the jaws to lie at 90 degrees to the artery, 10mm. distal to the second clip.

Check there are no intervening strands of tissue.

Check you can see the ends of the scissor jaws.

194 CUT THE CYSTIC ARTERY

Use a smooth steady cutting action.

If the scissors do not cut completely through the artery at the first attempt, repeat the cutting action once.

If the scissors do not cut properly at the second attempt, change them for a spare pair.

Use a disposable pair (Endoshears), if there are any more problems.

195 BLEEDING FROM THE CYSTIC ARTERY

Don't panic.

The camera magnifies the bleeding alarmingly.

Apply another clip if the anatomy is clear.

Do not insert clips blindly.

Connect the diathermy forcep to the diathermy machine.

Put the suction/irrigator in the subcostal port.

Put the diathermy forcep in the epigastric port.

Consider inserting an extra port.

Use plenty of irrigation.

Try local pressure with the forcep.

Grasp a 1-2mm. vessel precisely with forcep and coagulate it.

Grasp a larger vessel with forcep and wait for 3 minutes to allow spontaneous coagulation.

Dissect out a vessel held in forcep to allow clipping.

Wait 10 minutes before deciding on an open operation.

For uncontrollable bleeding, do a laparotomy.

Consider an emergency laparotomy.

196 **CYSTIC DUCT CUTTING**

197 POSITION THE SCISSORS

Place the scissors across the cystic duct between the single and double clips.

Place the non-moving scissor jaw behind the duct.

Manoeuvre the jaws to lie at 90 degrees to the duct, 10mm. distal to the second clip.

Check there are no intervening strands of tissue.

Check you can see the ends of the scissor jaws.

198 CUT THE CYSTIC DUCT

Use a smooth steady cutting action.

If the scissors do not cut completely through the duct at the first attempt, repeat the cutting action once.

If the scissors do not cut properly at the second attempt, change them for a spare pair.

Use a disposable pair (Endoshears), if there are any more problems.

If there is bile leakage from the proximal cystic duct, apply a further clip if the anatomy is clear.

If the clip is ineffective, try an Endoloop.

If the Endoloop is ineffective, consider suturing the cystic duct.

Consider converting to an open operation.

199 LOOK FOR A CYSTIC ARTERY IF YOU HAVE NOT CLIPPED ONE ALREADY

200 CHECK THE CYSTIC DUCT AND ARTERY

Check the vessel clips are tightly fastened.

Check there is not the slightest oozing from the vessel stubs.

For suspected common bile duct damage, do a conversion.

201 **GALLBLADDER FREEING**

202 CHECK THE TRACTION ON THE GALLBLADDER

Cutting the cystic artery and duct may slacken the upward traction on the fundus by the beak forcep.

Correct this by pulling up with the beaks forcep.

203 START THE GALLBLABBER DISSECTION

Aim to free the gallbladder from its bed starting at its neck and ending at the fundus.

Maintain your concentration. You still have a long way to go. No jokes.

Use the hook electrode.

Cut strands of tissue as they present themselves. ie **Cut the tight bits**.

This means dissecting from side to side freely. Swing the gallbladder from side to side with large movements of the spoon forcep in your left hand.

Maintain the tension on the gallbladder with the spoon forcep to show up the strands.

Cut the peritoneum before cutting the deeper strands.

Cut the peritoneum where it is attached to the gallbladder, 2mm. from the liver.

Avoid cutting the peritoneum on the liver and the liver itself.

Avoid cutting the gallbladder.

Avoid flicking the electrode onto the liver or other viscera during this dissection.

Take your time.

Be on the alert for arteries needing clipping.

If there is bleeding from the gallbladder bed during this dissection, apply local pressure using the gallbladder as a pack.

Move to a different part of the dissection while waiting for minor bleeding to stop.

Return to the bleeding site after 2 minutes.

Remove any blood with the suction/ irrigator.

Coagulate any bleeding vessel with the hook electrode.

Coagulation diathermy at level 2 may be better than normal coagulation to control a bleeding liver bed.

If bleeding persists, repeat the packing/coagulation.

If packing/coagulation fails a second time, consider an open operation.

If the gallbladder leaks, aspirate the bile and biliary mud.

If stones escape from the gallbladder, retrieve accessible stones with racquet forcep.

Leave inaccessible stones behind.

204 FINISH THE GALLBLADDER DISSECTION

As the dissection continues, retract the freeing gallbladder more and more upwards over the liver edge towards the diaphragm using the spoons forcep.

This will give access to the more distal gallbladder bed.

Dissect steadily through the strands.

Do not rush.

Finish the dissection slowly.

Wash/irrigate the gallbladder bed before cutting the last strands.

If the last strands make the gallbladder difficult to control:

> Pull the gallbladder downwards with the beaks.
>
> Cut the peritoneum with the hook from the superior surface.
>
> This manoeuvre will help avoid tearing the last strand of peritoneum between the gallbladder and the liver.

205 STORE THE GALLBLADDER ABOVE THE LIVER

Keep hold of the freed gallbladder with the beaks forcep on the fundus.

Push the gallbladder over the dome of the liver to get access to the right subphrenic space for suction.

206 REMOVE EXCESS FLUIDS

Use the suction/irrigator to irrigate and then aspirate blood, blood clots and any bile from the abdominal cavity.

Avoid aspirating CO2, which causes very rapid loss of pneumo-peritoneum and vision.

Use short stabs of suction to prevent adventitia blocking the sucker.

Irrigate and aspirate any blood from the right subphrenic space.

Irrigate and aspirate any blood from the right subhepatic space.

Irrigate and aspirate any blood from the gallbladder bed.

Manage bleeding as before. Minor oozes will stop spontaneously.

Look out for bile leakage from the gallbladder bed.

Manage gallbladder bed bile leakage with coagulation. Bile leakage does not stop spontaneously.

Check the cystic duct and artery for leakage.

207 DECIDE ABOUT DRAINAGE

Usually no drainage is needed.

Drain if there is excessive oozing fron the gallbladder bed, or a treated gallbladder bed bile leak.

Cut the Portovac drain distal to its perforations.

Cut off the introducer needle.

Pass the drain, perforations first, through the subcostal port,

Clamp the drain externally with an artery forcep to prevent a CO2 leak.

Position the perforated part of the drain in the gallbladder bed using the beaks forcep.

Pull out the subcostal port leaving the drain in site.

Unclip and reapply the artery forcep to allow removal of the port from the drain.

Stitch the drain to the skin:

Use a No 1 silk stitch (Ethicon W799).

Put 4 throws on the the knot on the skin to make a gastight closure around the drain.

Wrap the stitch round the drain 4 times, making a minor waist to prevent the drain pulling out.

Tie again with 4 throws.

Cut the ends cut 4cm. long.

208 **GALLBLADDER REMOVAL**

Use the epigastric port

209 REMOVE THE DIATHERMY HOOK

210 REMOVE THE EPIGASTRIC CONVERTOR

211 PLACE THE ROTWEILER FORCEP IN THE EPIGASTRIC PORT

212 SHOW THE ROTWEILER FORCEP ON THE SCREEN

213 SWING THE ROTWEILER FORCEP TO ABOVE THE LIVER

214 GRASP THE GALLBLADDER WITH THE ROTWEILER FORCEP

Grasp the neck of the gallbladder at the clip.

215 RELEASE THE BEAK FORCEP FROM THE GALLBLADDER

Close the jaws of the beak forceps under direct vision on the screen to prevent visceral damage.

216 PULL THE GALLBLADDER TOWARDS THE EPIGASTRIC PORT

Have the cameraman show the way up to the epigastric port opening on the anterior abdominal wall (the ceiling).

217 PULL THE EPIGASTRIC PORT OUT WITH THE ROTWEILER FORCEP INSIDE IT

218 PULL THE GALLBLADDER UP INTO THE EPIGASTRIC WOUND

Rarely, the gallbladder will pull easily out through the wound at this stage. GO TO OPSTEP 226 (PULL OUT THE GALLBLADDER)

Usually, the gallbladder is too distended to pass through the wound.

Read on.

219 GRASP THE GALLBLADDER NECK OUTSIDE THE WOUND

Use 2 Roberts' forceps to hold the corners of the gallbladder.

Remove the Rotweiler forcep.

Use the Roberts' forceps to prevent the gallbladder dropping back into the peritoneal cavity.

If the gallbladder drops back into the peritoneal cavity, replace the port and equipment to find the gallbladder again.

Plug the epigastric wound temporarily with a finger to allow the pneumoperitoneum to build up.

If the gallbladder will not go through the epigastric wound:

Keep hold with the Rotweilers.

Enlarge the opening as in OPSTEP 225 (ENLARGE THE EPIGASTRIC OPENING)

***090103 If the patient is too fat for the gallbladder to reach the skin:

Enlarge the opening using a scalpel to make, in effect, a mini-mini-open laparotomy.

Remove the gallbladder.

Use a retrieval bag.

220 OPEN THE GALLBLADDER

Use 2 Robert's forcep to hold the gallbladder wall above the skin.

Open the intervening gallbladder wall with scissors.

221 SWAB THE BILE

Send the specimen for culture.

222 ASPIRATE THE GALLBLADDER

Pass the suction/irrigator down to the fundus of the gallbladder.

Check on the monitor that the gallbladder is emptying.

Try to avoid contaminating the epigastric wound with potentially infected bile.

223 TRY PULLING OUT THE GALLBLADDER

The gallbladder will come out if it has emptied enough to pass through the epigastric port.

If the gallbladder comes out:

GO TO OPSTEP 226 (PULL OUT THE GALLBLADDER)

If the gallbladder is too thick, or contains too large a mass of stones:

Read on.

224 TRY CRUSHING THE STONES

Use a Roberts' forcep.

Pass the forcep down the epigastric opening, outside the gallbladder.

Crush the stones through the gallbladder wall.

Stretch the epigastric opening with the forcep as you pull the for forcep out.

Try pulling out the gallbladder again.

If the gallbladder is still too thick, or the stones are too large:

Read on.

225 ENLARGE THE EPIGASTRIC OPENING

Push a slightly angled grooved director into the epigastric opening alongside the gallbladder.

Face the grooves away from the gallbladder.

Cut the epigastric opening 1-2mm. caudally.

Use a scalpel with a no.15 Swann-Morton blade to run down the grooves, sharp side facing outward.

This will enlarge the opening to allow the gallbladder to pull out.

If the blade breaks, retrieve it using the racquet forcep passed down the epigastric port.

Repeat this cutting until the opening is wide enough for the gallbladder to pull out.

226 PULL OUT THE GALLBLADDER

It is difficult to make this move look elegant.

Repeat the cutting of the abdominal wall as needed.

Cut the skin in the same way if the skin opening is too small. You can easily underestimate the size of the gallstones on the monitor.

Avoid bursting the gallbladder by trying to pull it through too small a hole.

If gallstones spill back into the peritoneal cavity, ignore them.

Take great care to remove all stones inadvertently spilling into the anterior

abdominal wall fat. They may need secondary removal if left.

227 SEND THE GALLBLADDER FOR HISTOLOGY

228 REMOVE THE SUBCOSTAL FORCEP

229 REMOVE THE SUBCOSTAL PORT

230 REMOVE THE ILIAC FORCEP

231 REMOVE THE ILIAC PORT

232 REMOVE THE CAMERA

233 PRESS OUT EXCESS CO2

Use the umbilical port with the gas valve open.

234 REMOVE THE UMBILICAL PORT

235 SWITCH OFF THE INSUFFLATOR

This will prevent the CO2 bottle emptying.

236 SWITCH OFF THE LIGHT SOURCE BULB

Let the Light Source fan run for a further 10 minutes.

237 CHECK THE SWAB, NEEDLE, AND INSTRUMENT COUNTS

238 WOUND INFILTRATION

239 **WOUND CLOSURE**

Infiltrate the 4 wounds with a total of 20ml. 0.25% Bupivacaine.

Close an epigastric port wound of over 15mm. diameter with interrupted 2/0 Vicryl (Ethicon 9125).

Close the 10mm. port wounds with subcuticular Vicryl (Ethicon 9890).

Use Suture Strips to the 5mm. port wounds.

240 APPLY COMPLIANT DRESSINGS

Mepore.

241 REMOVE ANY NASO-GASTRIC TUBE

242 CHECK THERE IS NO OTHER PROCEDURE TO DO

243 CONNECT UP THE SUCTION SYSTEM

244 **FINAL TOUCHES**

245 FILL IN THE HISTOLOGY AND BACTERIOLOGY FORMS

246 WRITE LEGIBLE OPERATION DETAILS

247 FILL IN THE SURGICAL AUDIT FORM

248 FILL IN THE LAPAROSCOPIC CHOLECYSTECTOMY AUDIT FORM

249 DICTATE AN OPERATION LETTER TO THE GENERAL PRACTITIONER PLUS A COPY TO THE REFERRING PHYSICIAN

250 SWITCH OFF POWER TO:
VIDEO, TV,
MONITORS,
LIGHT SOURCE,
INSUFFLATOR,
DIATHERMY

Provided another laparoscopic cholecystectomy is not being done on the operating session.

251 REMOVE VIDEO CASSETTE

252 CLOSE CO_2 BOTTLE

253 **END OF OPERATION**