



DAY CASE LAPAROSCOPIC CHOLECYSTECTOMY



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1. Introduction

As laparoscopic cholecystectomy gained widespread acceptance as the treatment of choice for gallbladder disease in the early 1990's, many surgeons found their operating time decreased significantly from several hours to well within 60 minutes or less, with their conversion rate to the open procedure reducing to around 5%. These advances resulted from the surgical learning curve and from rapid technological advances in laparoscopic instrumentation. Laparoscopic cholecystectomy, therefore, became feasible as a day case procedure. Indeed, day case laparoscopic cholecystectomy is now listed both on the BADS trolley of procedures (1999)¹ and also in the Audit Commission basket of procedures for day surgery published in 2000².

Early experience of day case laparoscopic cholecystectomy produced very high overnight admission rates of up to 44%³, but more recent studies have shown more acceptable overnight unplanned admission rates of less than 10%⁴⁻⁷. It can be argued that this is far in excess of the 2–3% normally accepted for intermediate day case procedures, but if overall day surgery rates are to achieve the hoped for 75%, as targeted in the NHS plan⁸, then this higher unplanned admission rate for more major procedures is acceptable, at least initially, in most units. The reduction in overnight admission rates to less than 10% is due to rigorous patient selection, accepting only well motivated patients and attention to detailed anaesthetic and surgical technique.

This booklet is intended as a guide for those who are new to day case laparoscopic cholecystectomy or are considering setting up a service and for anyone involved in the preassessment and perioperative care of such patients.

2. Patient Selection

a. Generic Factors Influencing Laparoscopic Cholecystectomy

i. Previous abdominal surgery

Previous surgery to the upper abdomen is a relative contraindication to laparoscopic cholecystectomy. If the patient has had a previous laparoscopy, then an open cut down technique with primary port insertion at the umbilicus, rather than the closed technique, is the technique of choice on safety grounds. Many surgeons now use this technique routinely. Placement of the first port at the sub-xiphisternal site is a good alternative for anticipated difficult cases. Previous surgery in the lower abdomen and pelvis, as indicated by appendectomy incisions, lower midline incisions or Pfannenstiel incisions, indicates the possibility of lower abdominal or pelvic adhesions, but in many cases it is still possible (using the open technique) to create a safe pneumoperitoneum, as the upper abdominal contents are often adhesion free and are easily seen and identified. In contrast, previous upper abdominal surgery, such as gastrectomy, repair of perforated ulcer or Nissen's procedure may indicate severe underlying adhesions. However, adhesion formation is extremely unpredictable and the skilled laparoscopist will be prepared to attempt diagnostic laparoscopy before making a final decision to convert to open cholecystectomy.

ii. Gallstone complications

Routine laparoscopic cholecystectomy is contraindicated in the presence of obstructive jaundice due to gallstones or dilated ducts on ultrasound. This situation requires preoperative endoscopic retrograde cholangiopancreatography (ERCP) or peri-operative laparoscopic exploration of the common bile duct. While elevated liver function tests (LFTs) may indicate bile duct stones, sequential measurements showing a gradual return to normal levels often indicates that the stone has passed and safe laparoscopic cholecystectomy may proceed. Some surgeons may still consider a thick walled gallbladder (suggesting active inflammation) or empyema of the gallbladder as relative contraindications to laparoscopic gallbladder removal. However, these findings may still occur unexpectedly, despite careful screening, and do not appear to adversely affect outcome⁷.

After pancreatitis or ERCP, a period of 2–6 weeks (depending on surgeon preference) has been recommended before proceeding to laparoscopic cholecystectomy, as the risk of postoperative pancreatitis following laparoscopic cholecystectomy was thought to be significantly raised in these patient groups. However, this is now disputed and many surgeons favour performing the laparoscopic cholecystectomy at a much earlier stage.

b. Day Case Factors Influencing Laparoscopic Cholecystectomy

i. Body Mass Index (BMI)

Many day units now accept patients for laparoscopic cholecystectomy with a BMI between 35 and 40 kg/m². This is based on evidence that overall morbidity in day surgery is not significantly increased when compared to patients with a BMI less than 35⁹. Following day case laparoscopic cholecystectomy specifically, outcomes appear similar for patients with a BMI of 30 kg/m² and over and, probably, also for those exceeding 35 kg/m², compared to lighter patients¹⁰. However, in this moderately obese group, the shape of the patient may be more important than the actual BMI. Patients who are “pear shaped” (i.e., a high BMI but relatively thin abdomen) may be more suitable than those who are “apple shaped” (i.e., BMI may be moderate but the abdomen is corpulent)¹¹.

ii. Co-morbidity

Day case laparoscopic cholecystectomy is a major surgical procedure and patient selection regarding co-morbidity should err towards caution. While it is possible to operate on ASA class III patients or type I & II diabetics or those with significant cardiac disease, the entire day surgery process requires a problem free day from admission to discharge. Any minor problem or delay will create an unplanned overnight admission and such patients are best excluded, at present, from most day units.

iii. Motivational factors

As day surgery embraces more major surgical procedures, it is even more important to ensure that patients are appropriately counselled and motivated. From experience, patients with a “get up and go” personality usually are successful day cases. Anxious patients can have variable outcomes, depending on whether their primary concern is their safety or a fear of hospitals. Family factors are also important and the cooperation and motivation of the main carer is important.

3. Pre-operative assessment

The aim of preoperative assessment for the patient awaiting laparoscopic cholecystectomy is to ensure they have not developed any complications of gallstones or gallbladder disease before going for surgery and that the operation remains a routine laparoscopic cholecystectomy. Therefore, in addition to the normal generic preoperative assessment for day surgery, patients undergoing laparoscopic cholecystectomy require a biliary system work up. This consists of:-

a. History

Recent (within the last 4–6 weeks) attacks of right upper quadrant pain may be biliary colic secondary to chronic cholecystitis but, if they are associated with fever, can indicate an attack of acute cholecystitis. Surgery on the inflamed gallbladder carries a much higher risk of conversion to the open procedure, due to the difficulty of identifying the common bile duct, the cystic duct and the cystic artery in an inflamed operative field. In addition, a really inflamed gallbladder may be more technically challenging to the surgeon and may result in a prolonged operative procedure, although this will not inevitably result in an unplanned overnight admission.

b. Investigations

A list of possible investigations with the rationale for each is shown in table 1.

Table 1

Possible investigations when considering day case laparoscopy and the underlying reasons. Not all units require all (or any) of these investigations, see recent NICE guidelines for further advice.

Investigation	Reason
FBC (Baseline)	Reactionary or secondary haemorrhage occurs in approximately 5% of patients.
ECG (Baseline)	Perioperative cardiac events can occur due to the pneumoperitoneum creating diaphragmatic splinting or pressure on the inferior vena cava
Group & Save	Severe perioperative haemorrhage or reactionary haemorrhage are now rare due to improved surgical techniques & cross matched blood is therefore unnecessary
LFTs	Elevated LFTs can identify common bile duct stones preoperatively

Elevated liver function tests if mild (2 x normal bilirubin) indicate a stone which has recently passed down the common bile duct into the duodenum. It is worthwhile to simply repeat the liver function tests two weeks later and only consider an intervention if they remain elevated. If the LFTs are moderate to severely elevated (for example, >2 x normal bilirubin), further investigation may be required to identify ductal stones. A magnetic resonance cholangiopancreatogram (MRCP) is becoming the investigation of choice, but is not yet universally available. Previously, an ultrasound or ERCP have been used for diagnosis or an ERCP has been performed for both diagnosis and ductal stone removal.

c. *Patient Advice*

When listing the patient for day case laparoscopic cholecystectomy in several weeks time, it is important that dietary advice (preferably written) regarding a low fat diet is provided for the patient. Patients should also receive written information concerning preoperative preparation and postoperative care. As well as general advice relevant to day surgery, patients should be warned about shoulder tip pain and symptoms, such as increasing pain, malaise and fever, indicative of a serious postoperative problem. Emergency contact information should be provided and postoperative telephone follow-up is advisable, especially while setting up a new service. Some units use the district nurse service to provide additional postoperative support.

4. Anaesthetic Technique

As with any day case procedure, laparoscopic cholecystectomy requires an anaesthetic technique which provides for a rapid recovery and minimises the incidence of side effects. In addition, particular consideration needs to be given to prevention and treatment of postoperative nausea and vomiting (PONV) and pain management.

a. *Choice of Anaesthetic Agent*

Many anaesthetists advocate propofol-based techniques, due to their beneficial reduction of PONV¹². Other workers achieve satisfactory results with volatile anaesthetics, however^{5, 6}. Omitting nitrous oxide does not reduce the occurrence of PONV after laparoscopic cholecystectomy, neither does it improve surgical conditions¹³. Ultra-short-acting anaesthetics and analgesics may be especially useful in obese patients undergoing this procedure¹⁴.

b. *Airway Management*

Controversy remains over the use of the laryngeal mask airway (LMA) for laparoscopic cholecystectomy. One trial has shown the LMA to be as *effective* as a tracheal tube, providing comparable surgical conditions and gastric distention during laparoscopic cholecystectomy¹⁵. However, others have expressed concerns that reflux of gastric contents and bile, which is especially irritant, may be more common during gall bladder surgery¹⁶. At least one case of aspiration during cholecystectomy with the LMA has been reported¹⁷. The Proseal[®] LMA may offer increased protection from aspiration and provides increased seal pressure and easier controlled ventilation compared to the conventional LMA during laparoscopic cholecystectomy¹⁸. There is currently insufficient published evidence on which to judge its safety, but some anaesthetists have used it extensively without apparent problems.

c. *Postoperative Nausea and Vomiting (PONV)*

i. Risk factors

PONV is common after laparoscopic cholecystectomy, possibly because of peritoneal gas insufflation, bowel and biliary tree manipulation. Additional risk factors include female gender, previous history of PONV or motion sickness, being a non-smoker and the use of perioperative opioids¹⁹. The latter are a common cause of PONV and their use, even during laparoscopic cholecystectomy, should be reduced to the minimum necessary. The effect of drugs used to reverse neuromuscular block on PONV is controversial, but it seems sensible to avoid them if spontaneous recovery of neuromuscular function is sufficient.

- ii. Prophylaxis
PONV is sufficiently common after laparoscopic cholecystectomy that antiemetic prophylaxis is justified. This should be provided with an agent which is effective and relatively free from adverse effects. Ondansetron and dexamethasone are suitable, the latter may be preferable since it is long lasting and also may provide a degree of analgesia. Combinations of multiple antiemetics of different classes may provide even more effective prophylaxis. Adequate hydration, with at least one litre of intravenous fluid during the procedure²⁰ is an important additional measure to reduce PONV.
- iii. Therapy
PONV should be promptly treated when it occurs, preferably using an antiemetic of a different class to that used for prophylaxis. Further rehydration may be necessary. Intractable PONV is not an automatic indication for hospital admission, provided that the patient is able to retain some fluids and is still happy to be discharged. Consideration should be given to take-home antiemetic therapy. Buccal, sublingual or subcutaneous routes of administration are preferable in this instance, as they will ensure adequate drug absorption even in the presence of nausea. PONV is common in the immediate recovery period, often persists for one to two days, but usually resolves thereafter. However, a small minority of patients experience severe PONV for many days after laparoscopic cholecystectomy.

d. *Postoperative Pain*

- i. Multimodal analgesia
Effective pain relief should be provided with local anesthesia, nonsteroidal antiinflammatory drugs (NSAIDs) and opioid analgesics used in combination²¹. This allows the opioid dose to be minimised, thereby limiting side effects and reduces pain and PONV compared to the use of analgesics in isolation.
- ii. Nonsteroidal antiinflammatory drugs (NSAIDs)
NSAIDs are extremely effective analgesics and should be used unless there is an absolute contraindication. Ibuprofen and diclofenac are well-established and have a reasonable safety profile. The oral route is preferable to rectal or parenteral administration²². Giving the first dose about an hour before the operation starts also produces better and longer-lasting pain relief compared to postoperative delivery²³. NSAIDs should be administered at regular intervals and the patient should be given a supply sufficient to last at least five days to take home. NSAIDs with a long half life or sustained release preparations, which permit once-daily dosing, may be more convenient. Selective COX₂ inhibitors do not offer significant benefits for most patients, but may prove useful in a few specific situations.

iii. Paracetamol and codeine compounds

Paracetamol and paracetamol-codeine combinations can be used to supplement the analgesia provided by NSAIDs. They appear to have an additive effect as analgesics, but have a different side-effect profile and so do not substantially increase risk. These drugs may also be used as first-line analgesia where NSAIDs are contraindicated. A take-home supply should again be provided for several days.

iv. Local anaesthesia

Although much of the postoperative pain is deep in nature, the laparoscopy portals should always be infiltrated with a long acting local anaesthetic (such as bupivacaine or *levobupivacaine*). Intraperitoneal local anaesthetic sprayed between liver and diaphragm has been reported to reduce pain after laparoscopic cholecystectomy²⁴, but the results are variable and quite a high dose is required. Simple port infiltration is easier and probably as effective; there appears to be little difference between infiltration at the beginning or the end of the procedure. 0.5% solutions should be used at a maximum total dose of 2 mg/kg (20 ml will be safe and effective in the majority of adults).

v. Opioids

Opioid analgesics are usually administered intraoperatively, but their routine use should be discouraged. However, they may be needed to treat acute pain in the early postoperative period. The dose should be carefully titrated so as to provide adequate analgesia whilst minimising side effects, such as nausea, respiratory depression and sedation. Systemic opioids should not be required beyond the first few hours of recovery, when oral analgesics are usually sufficient. Traditionally, pethidine is said to be the opioid of choice in association with biliary surgery, due to its anti-spasmodic effects. In practice, other opioids seem equally effective with no obvious disadvantage. Fentanyl is sometimes used in the early postoperative period.

vi. Natural history of pain

Pain is common after laparoscopic cholecystectomy, despite the use of prophylactic, multimodal analgesia⁷. The majority of patients are likely to require some opioid analgesia during early recovery and one or two doses of oral analgesia prior to discharge. Pain tends to be moderately severe during the first one or two days, declining rapidly in intensity beyond that. A few patients experience prolonged and severe pain, but this is not common. Severe pain may prevent discharge on the day of surgery, but this should be an unusual event with appropriate therapy.

5. Surgical Technique

a. *Surgical Team*

Day case laparoscopic cholecystectomy requires a competent surgeon (Consultant, experienced Specialist Registrar or Staff and Associate Specialist) with appropriately experienced assistance. Some units now employ a Laparoscopic Nurse Practitioner to provide such assistance as a permanent member of the surgical team.

b. *Operating Time*

Routine laparoscopic cholecystectomy should take under an hour, although patients whose operation takes up to 90 minutes can still go home as a day case, provided the operation has been performed early in the day and there is at least six hours of postoperative recovery time available.

c. *Port Insertion*

Many surgeons have now downsized and reduced in number the ports required for laparoscopic cholecystectomy, using a 10 to 12 mm primary umbilical port and two 5 mm secondary ports placed in the epigastrium and right flank. While there is no evidence that this reduces postoperative pain²⁵, it seems logical that a reduction in surgical trauma to the abdominal wall may be beneficial.

d. *Pneumoperitoneum*

During the procedure it is important to maintain the carbon dioxide (CO₂) pneumoperitoneum at the lowest possible pressure, ideally under 12 mmHg:-

- i. to avoid inferior vena cava compression leading to circulatory collapse
- ii. to prevent diaphragmatic splinting which affects mechanical ventilation.

At the end of the procedure, as much of the CO₂ as possible should be released from the abdomen, as postoperative shoulder tip pain is proportional to the size of the residual gas bubble under the diaphragm²⁶.

e. *Postoperative Pain*

Postoperative pain can be reduced by local anaesthetic infiltration, but is also improved by ensuring a haemostatic liver bed. Free blood within the peritoneal cavity is irritant and painful, as eloquently demonstrated by patients with a ruptured spleen or ectopic pregnancy. Spilt bile should also be carefully aspirated and as much CO₂ as possible should be removed.

6. The Cynic's View

"Why I Won't Perform Day Case Laparoscopic Cholecystectomy"

There are four common arguments:

1. Reactionary haemorrhage

Haemorrhage within the first 4–6 hours after surgery is uncommon and can be addressed within an ordinary working day if the surgery is performed before noon. If the surgeon is worried about postoperative bleeding at the end of the procedure, then a suction drain can easily be inserted and removed several hours later, which still allows the patient to go home as a day case. Common occurrence of reactionary haemorrhage indicates questionable surgical technique.

2. Secondary haemorrhage

Secondary haemorrhage tends to occur three or more days postoperatively and even if the patient had inpatient operation, they would still have gone home by the time this event occurred.

3. Biliary leak

The commonest causes of biliary leak are the clips coming off the remnant of the cystic duct or, less commonly, from thermal damage to the bile ducts due to injudicious use of diathermy. Both of these events occur several days after the procedure and again are not an argument against performing day case laparoscopic cholecystectomy.

4. Postoperative analgesia

Patients undergoing laparoscopic cholecystectomy do require pain relief which needs to be tailored to their needs. This is best performed by the day surgery team, who are familiar in dealing with mild to moderate postoperative pain. General Practitioner contact for postoperative pain relief is now a rare occurrence after any form of day surgery, provided the day unit provides comprehensive support following discharge.

7. Discharge Criteria

All of the usual day surgery discharge criteria²⁷ apply to patients undergoing laparoscopic cholecystectomy. However, if the patient has had an intra-abdominal procedure, albeit by minimally invasive surgery, then it is more important than usual to ensure that the patient can tolerate oral fluids. If the patient has been well and they returned from theatre early in the day, then a light diet may be tolerated. Day case laparoscopic cholecystectomy is successful if the surgery is performed at the beginning of the day and at least six hours postoperative recovery and observation is provided before allowing the patient to return safely home.

8. Facilities

While a high proportion of patients can successfully undergo day case laparoscopic cholecystectomy, unanticipated admission rates are somewhat higher than established day case procedures, especially during the early part of the learning curve. Where surgeons are reluctant to transfer directly from an inpatient procedure to day surgery, an extended day surgery, or 23 hour, facility may serve as a half-way house while confidence and experience are gained. It may also be difficult to predict which patients will require an overnight stay at first, and the addition of a 23 hour unit to an established day surgery facility can assist in patient management³. However, it is important that any 23 hour facility is seen as an extension to day surgery and not as an alternative.

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