

ALS Clinical Guidelines

Recognition, Management and Prevention of Abdominal Complications of Laparoscopic Surgery

Whilst laparoscopic surgery confers many advantages to patients, it has become apparent its abdominal complications have more subtle clinical presentations than is usual after an equivalent operation carried out through a traditional laparotomy incision. It is vital that serious intraperitoneal complications are recognised **rapidly** and **expeditiously** in order that the advantages of laparoscopic surgery are fully delivered to the patient. When conditions such as bile leakage, bleeding or peritonitis occur after a laparoscopic operation it is often the case that the presence of a significant complication remains undiagnosed until circulatory collapse and septic shock develop. Most abdominal complications of laparoscopic surgery can be managed effectively, and often without resort to laparotomy, if their existence is appreciated before circulatory collapse and septic shock have developed. The aim of these guidelines is to assist in the early recognition of potentially serious abdominal complications of laparoscopic surgery and to lay a reasoned foundation for diagnosis and management.

Injuries that Occur during Laparoscopic Operations

Peritonitis can occur as a result of: (a) injury to the small or large bowel sustained during access to the peritoneal cavity, whether by the use of the 'closed' or 'open' puncture techniques, (b) damage to the bowel during division of adhesions, (c) unintentional injury to the bowel during the use of monopolar diathermy or recent innovations such as ultrasonic shears, (d) manipulation with forceps etc. Inevitably, such injuries will occur from time to time even in the most expert hands, as has traditionally been the case with access to the abdominal contents by laparotomy. It is not the injury itself which is critical, rather the lapse of time before it is identified and corrected.

Specific types of operation may be associated with specific risks. For instance, laparoscopic division of adhesions may result in occult perforation of the small or large bowel, and laparoscopic cholecystectomy may result in leakage of bile into the peritoneal cavity, possibly as a result of the transaction of a small biliary radical passing between the liver and the gall bladder itself. Even with the best imaging systems, and the most meticulous technique, such injuries may not be appreciated at the time of surgery,

although it is imperative that surgeons develop awareness of situations where injury might occur so that a meticulous examination of any potentially injured bowel loops can be carried out at the time of the original surgery. Lack of this sensitivity to the potential for injury might explain why it is not uncommon for a surgeon who transects the common bile duct to be unaware that the injury has occurred at the time of the operation. It is also important to be aware that events can occur after the completion of a laparoscopic procedure. Bleeding may not become apparent until after an uneventful laparoscopic procedure has been concluded, because of the pressure of the pneumoperitoneum or because an injured vessel in the abdominal wall only starts to bleed when the cannula has been removed.

The clinical presentation of complications occurring after a laparoscopic procedure is frequently much more subtle than that expected after a traditional laparotomy. This is probably because the patient has not been subject to the stress of a major laparotomy and thus has near normal and resilient physiological responses. Nevertheless, bleeding, bile leakage and peritonitis are just as serious, and if unrecognised, or appreciated late, may have dire consequences for the patient.

Less common abdominal complications of laparoscopic surgery such as obstruction and strangulation, acute pancreatitis, portal vein thrombosis, and gut ischaemia may occur, but are not the primary subject of these guidelines. Nevertheless, all can be diagnosed on CT scan.

Clinical Manifestations of Complications of Laparoscopic Surgery

Most patients who developed peritonitis or bleeding after traditional surgery display evidence of respiratory difficulties, circulatory instability and guarding or rigidity. After laparoscopic surgery the signs are characteristically **much more subtle**, and are often overlooked until precipitous deterioration of the patient's condition has occurred, usually several days later.

The majority of patients who undergo a laparoscopic operation have relatively little pain and are eager to mobilise soon after the completion of the operation. Appetite is often hardly depressed at all, and it is commonplace for patients to eat a relatively full meal within a few hours of a laparoscopic procedure. Clearly, the rapidity with which normal activity is resumed is dependent upon factors such as magnitude of the operative procedure. Postoperative pain is more likely to be a feature if there has been extensive division of adhesions, or if it has been necessary to extend a laparoscopic incision in order to remove a large specimen or to introduce the surgeon's hand into the abdominal cavity.

If the following symptoms and signs are present during the second 12 hour period after the conclusion of a laparoscopic operation, the presence of an abdominal complication should be suspected:

- Abdominal pain needing opiate analgesia
- Anorexia or reluctance to drink
- Reluctance to mobilise
- Nausea
- Vomiting
- Tachycardia
- Abdominal tenderness
- Abdominal distension
- Poor urine output
- Cardiac arrhythmia

Pyrexia is usually absent at this early stage and tachycardia is not invariable. Abdominal tenderness may be of relatively minor degree and the classic signs of tenderness, guarding and rebound tenderness are usually absent.

The patient may well be able to get out of bed, and to take small amounts of food and drink, but **will not** have the **vitality, mobility and appetite** normally displayed by patients who have undergone an uncomplicated laparoscopic procedure.

In patients in whom an intra-abdominal complication is suspected, it is appropriate to request a full blood count, CRP, electrolytes and urea, liver function tests and plasma amylase, although biochemical investigations are often unhelpful at this early stage. There is likely to be an elevation of urea and creatinine towards the upper limit of the normal range or beyond. C-reactive protein is likely to be abnormally high, **but** the white blood count is often within the normal range.

In patients who have developed leakage of bile into the peritoneal cavity, liver function is usually abnormal. If there is associated **obstruction** of the bile duct, bilirubin, transaminase and alkaline phosphatase are all likely to be raised. If there is **no obstruction**, simply leakage of bile into the peritoneal cavity, bilirubin is characteristically the only abnormality, transaminase and alkaline phosphatase being normal or only mildly abnormal.

Intra-abdominal bleeding may be revealed by the drainage of blood through an abdominal drain. Whilst this may be helpful, the absence of significant bloodstained drainage cannot be used as a reliable guide that

bleeding has not occurred. If significant intra-abdominal bleeding has occurred it is important to evacuate the blood and if necessary stop further bleeding. **Clinical signs of bleeding** are **paramount**, and should not be overlooked because little in the way of blood has emerged through a drain.

As time passes it will become increasingly apparent that the patient's recovery is far from routine. Abdominal pain and distension are likely to persist: the patient will characteristically want to lie in bed; be reluctant to mobilise; food and drink will be accepted only in small amounts. Urine output will continue to decline, even if intravenous fluid is provided, and urea and creatinine frequently show further rises. If no action is taken, it is likely that precipitous circulatory collapse combined with organ will occur. It is essential that appropriate management is undertaken before such a late stage occurs.

Particularly careful attention should be paid to any patient who has a pulse rate of 100 or greater 2+ hours after a laparoscopic procedure.

Management of Patients with a Suspected Abdominal Complication of Laparoscopic Surgery

If, during the latter part of the first 24 hours after a laparoscopic procedure, patients manifest one or more of the clinical features in the list above, it is essential that the advice of a **senior member** of the surgical staff is sought. There is a great deal of variation amongst patients and amongst the operative procedures carried out, and it is important that an experienced clinician **evaluates** the patient's condition in the **context** of the procedure they have undergone. For instance, persisting and significant abdominal pain and tenderness are unexpected in the patient who has undergone a straightforward cholecystectomy but are not uncommon in patients who have had a laparoscopic incisional hernia repair. If all is well, there should be progressive improvement in the patient's condition, but it cannot be stressed enough that it is very important that an appropriately experienced clinician continues to monitor the improvement. In the **absence of clear evidence** of continuing improvement further investigation is **urgently** needed. This is particularly the case if there is abnormal liver function in the patient who has undergone a laparoscopic cholecystectomy.

Whilst few patients will come to harm if they undergo unnecessary investigation, many do come to harm because a complication of laparoscopic surgery goes unrecognised for an unwarranted period of time.

Abdominal ultrasound is frequently requested in patients in whom bile leakage or peritonitis is suspected, but it is an **extremely unreliable** investigation in this context. Large amounts of intraperitoneal fluid may go unrecognised by abdominal ultrasound, partly because gaseous distension of the bowel is an almost inevitable consequence of any form of noxious fluid within the peritoneal cavity. Ultrasound cannot penetrate gas, and frequently grossly underestimates the amount of peritoneal fluid that is present. Do not waste time with ultrasound. Only two investigations are appropriate in patients in whom it is suspected that a complication may have occurred. These are:-

- **Re-laparoscopy**
- **CT scan.**

The choice of investigation will depend upon the circumstances. If it is suspected that there is leakage of bile or peritoneal contents into the abdomen it is more logical to proceed immediately to re-laparoscopy rather than waste time with other investigations. Re-laparoscopy is not only diagnostic but enables treatment to be administered (washout of the peritoneal cavity, re-suture of an anastomosis, arrangement of effective drainage or laparotomy). If no abnormality is apparent at re-laparoscopy, careful irrigation of the peritoneal cavity with saline may be effective for the relief of pain. If it is difficult to arrange re-laparoscopy CT is the obvious alternative. It is important to request that any fluid within the peritoneal cavity is sampled when the CT scan is carried out.

If CT scan suggests that free blood or haematoma formation exists within the peritoneal cavity, of any significant extent, re-laparoscopy is indicated. Patients will make much more rapid progress if the haematoma is evacuated, and it also allows the surgeon to form a judgement about the presence of continued bleeding as well as the source of the bleeding. Nothing more than drainage may be needed, but on occasions packing and suturing may constitute an effective solution to the problem. If it is evident that bleeding cannot be adequately controlled laparoscopically, conversion to laparotomy should be undertaken.

As well as diagnosis, there are two objectives to the management of peritonitis in patients who have undergone a laparoscopic operation: (i) removal of contaminating fluid from the peritoneal cavity, (ii) correction of the source of the contamination. CT scan is highly sensitive for the detection of abnormal intraperitoneal fluid, and if combined with percutaneous aspiration, may reveal the origin of the fluid. Re-laparoscopy will reveal the presence and nature of intraperitoneal fluid, and will allow the peritoneal cavity to be thoroughly washed out, even if its precise source

remains obscure. On occasions, the source of leakage may be determined by re-laparoscopy, an example being leakage of bile into the gallbladder bed from a small accessory bile duct. Under these circumstances the laparoscopic placement of a drain may be all that is required to resolve the complication.

Whichever of these two investigations is selected, it is imperative that one or the other is carried out without delay if there is a suspicion of a serious intra-abdominal complication of laparoscopic surgery.

Other investigations may be appropriate. For example, ERCP is appropriate if bile is found in the peritoneal cavity. This may help with identification of the cause of bile leakage and may indicate the need for referral to a specialist centre, if there is a bile duct injury, or decompression of the bile duct with a stent if there is a bile leak that can be expected to heal with conservative management.

If re-laparoscopy or percutaneous drainage under imaging control reveals the presence of infected or intestinal fluid within the peritoneal cavity, it is vital that the source of the intestinal leak is identified, that appropriate action is taken to prevent further leakage and that the peritoneal cavity is thoroughly washed out to remove contaminating fluid and solid matter. If there is a small amount of contamination it can be feasible to manage the leakage laparoscopically, but in most instances it will be necessary to convert to laparotomy. **Delay** may cost the life of the patient.

In summary, if an intra-abdominal complication is suspected, request:

- Re-laparoscopy

Or

- CT scan

and do not waste time.

Prevention of Intra-abdominal Complications of Laparoscopic Surgery

- Maintain the best possible vision at all times
- Avoid the use of sharp instruments unless absolutely necessary
- Take extreme care with the use of diathermy, or ultrasonic devices (remember that the tip of the instrument may remain hot even if the power has been switched off)
- Check that bowel has not been injured during access

- Before leaving the abdominal cavity take care to check all areas where injury to tissue may have occurred
- Inspect all cannulation sites after withdrawal of the cannula at the conclusion of the operation (lightly place a finger over the skin wound at the time of inspection so that any bleeding will run into the abdominal cavity and be seen easily)
- Where necessary, use a drain

Finally, ensure that all patients are given appropriate contact details and instructed to contact the hospital, rather than their GP or another hospital, if any problems occur.