ALS Clinical Guidelines

Recognition, Management and Prevention of Abdominal Complications of Laparoscopic Surgery

Whilst laparoscopic surgery offers many advantages to patients, it has become apparent that abdominal complications present in a more subtle way 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 treated 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 they are treated 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 injuries to the small or large bowel sustained during access to the peritoneal cavity (whether by the use of the 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 of forceps, (e) leakage from staple lnes or anstomoses. Inevitably, such injuries will occur from time to time even in the most expert hands, as has traditionally been the case at 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 bowel, and laparoscopic cholecystectomy may be complicated by leakage of bile into the peritoneal cavity. 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 pnemoperitoneum or because an injured vessel in the abdominal wall only starts to bleed when a cannula has been removed.

The clinical present 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 more normal and resilient physiological responses. Nevertheless, bleeding, bile leakage and peritonitis are just as serious, and if unrecognised, may have dire consequences for the patient.

Less common abdominal complications of laparoscopic surgery such as acute pancreatitis, portal vein thrombosis, and gut ischaemia may occur, but are not the primary subject of these guidelines.

Clinical Manifestations of Complications of Laparoscopic Surgery

Most patients who developed peritonitis or bleeding after traditional surgery display florid signs of circulatory instability and peritonitis. After laparoscopic surgery the signs are characteristically much more subtle, and are often overlooked until precipitous deterioration of the patient's condition occurs, 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 the magnitude and type of operation. 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 surgeons and 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 (>100)
- abdominal tenderness
- abdominal distension
- poor urine output

Pyrexia and tachycardia frequently absent at this early stage, and abdominal tenderness may be of relatively minor degree. 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 normal vitality, mobility and appetite characteristically displayed by patients who have undergone an uncomplicated laparoscopic procedure.

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**, sim,ply 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. Tochycardia and abdominal pain may be the only clinical manifestations of bleeding often a laparoscopic operation despite significant blood loss.

As time passes it will become more 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 and be reluctant to mobilise, and 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 characteristically show further rises. If no action is taken, it is likely that precipitous circulatory collapse collapse combined with organ failure will eventually occur. It is the 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 6 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 illustrated in the list above, it is the 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. If all is well, they should be progressive

improvement in the patient's clinical condition, but it is very important that an appropriately experienced clinician monitors 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 a patient who has undergone a laparoscopic cholecystectomy.

Whilst few patients will come to harm if they undergo unnecessary investigation, many do come to harm if there is unwarranted delay.

Abdominal ultrasound is frequently requested in patients in whom bile leakage or peritonitis are 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, re0suture 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 peritonea 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, we 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 and the source of the bleeding. Nothing more than drainage might 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. One is the removal of contaminating fluid from the peritoneal cavity, and the other is 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 of fluid, may reveal the origin of the fluid. Re-laparoscopy will reveal the present and nature of intraperitoneal fluid, and will allow the peritoneal cavity to be thoroughly washed out, even if the precise source of the fluid 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 most important that one or the other is carried out 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 indicate an injury to the bile duct that is most appropriately managed by a referral to a specialist centre, or may indicate, for example, a leak from the cystic duct stump that merely requires decompression of the bile duct with a stent.

If re-laparoscopy or percutaneous drainage under imaging control reveals the presence of infected or intestinal fluid within the peritoneal cavity, urgent laparotomy is indicated. Delay may cost the life of the patient.

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

- CT scan

or

- re-laparoscopy

and do not waste time.

Prevention of Intra-abdominal Complications of Laparoscopic Surgery

During the laparoscopic procedure:-

- maintain the best possible vision at all times
- avoid the use of sharp instruments unless absolutely necessary
- take extreme care with the use of monopolar diathermy
- check that bowel has not been injured during access
- before leaving the abdominal cavity take care to check all areas where it injury to fissure of may have occurred
- inspect all cannulation sites after withdrawal of the cannula at the conclusion of the operation
- where indicated, use a drain