

LAPAROSCOPIC SURGERY

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Minimal access surgery

is a product of modern technology and surgical innovation that aims to accomplish surgical therapeutic goals with minimal somatic and psychological trauma .

Also known as laproscopic surgery or minimal invasive surgery .



Historical background

- 1901 1st experimental laparoscopy procedure done by Georg Kelling termed "celioscopy" -examined abdominal cavity in dogs using cystoscope
- Hans Christian Jacobaeus → successfully applied minimal invasive techniques in human
 - Coined the term "laparoscopie" and "Thoracoscopie"

Core principle of MIS

(I-VITROS)

I -insufflate/create space

V-visualize-(anatomical landmark, tissue , surgical environment)

I -identify-(specific structures for surgery)

T-triangulate(surgical tools to optimize efficiency, ergonomics, minimize crowding/clashing)

R -retract (manipulate and access the correct tissue plane)

O -operate (incise, suture, anastomose)

S -seal/Hemostasis



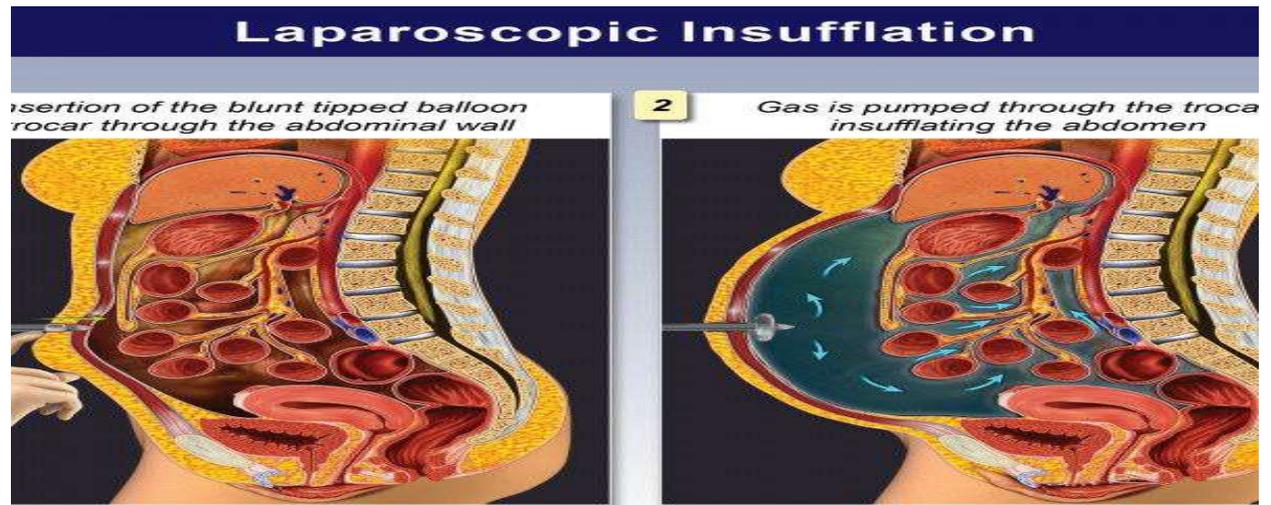
Figure 8.1 (a) Common laparoscopic trocars. (b) Common laparoscopic instruments (photo courtesy of Daniel Leff).

MIS categories

- Laparoscopy
- Thoracoscopy
- Endoluminal endoscopy-urology, git, respiratory and vascular systems
- Perivisceral endoscopy- mediastinoscopy, retroperitoneoscopy
- Arthroscopy and intra-articular joint surgery
- compined -Diagnostic/Therapeutic

Laparoscopy

Laparoscopy A rigid endoscope (laparoscope) is introduced through a port into the peritoneal cavity. This is insufflated with carbon dioxide to produce a pneumoperitoneum.



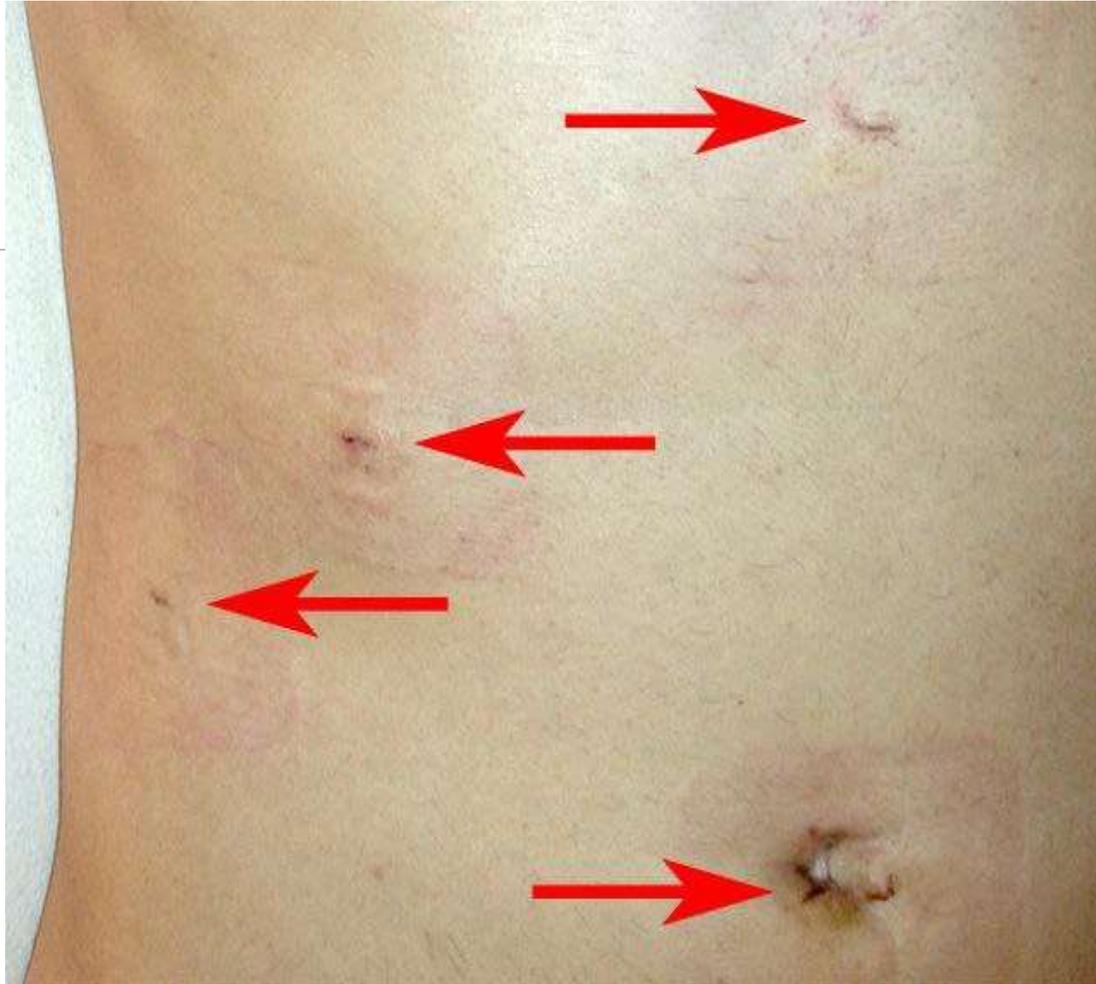
Further ports are inserted to enable instrument access and their use for dissection.



With improved instrumentation, advanced procedures, such as laparoscopic colectomies for malignancy, previously regarded as controversial, have also become fully accepted. There continues to be substantive evidence demonstrating the short-term benefits of laparoscopic surgery over open surgery with regard to postoperative pain, length of stay and earlier return to normal activities; however, the equivalence of the benefits in long-term outcomes, such as oncological quality and cancer-related survival, has not been established.

Advantages of minimal access surgery

- Decrease in wound size
- Reduction in wound infection, dehiscence, bleeding, herniation and nerve entrapment
- Decrease in wound pain
- Improved mobility
 - Decreased wound trauma
 - Decreased heat loss
 - Improved visualization

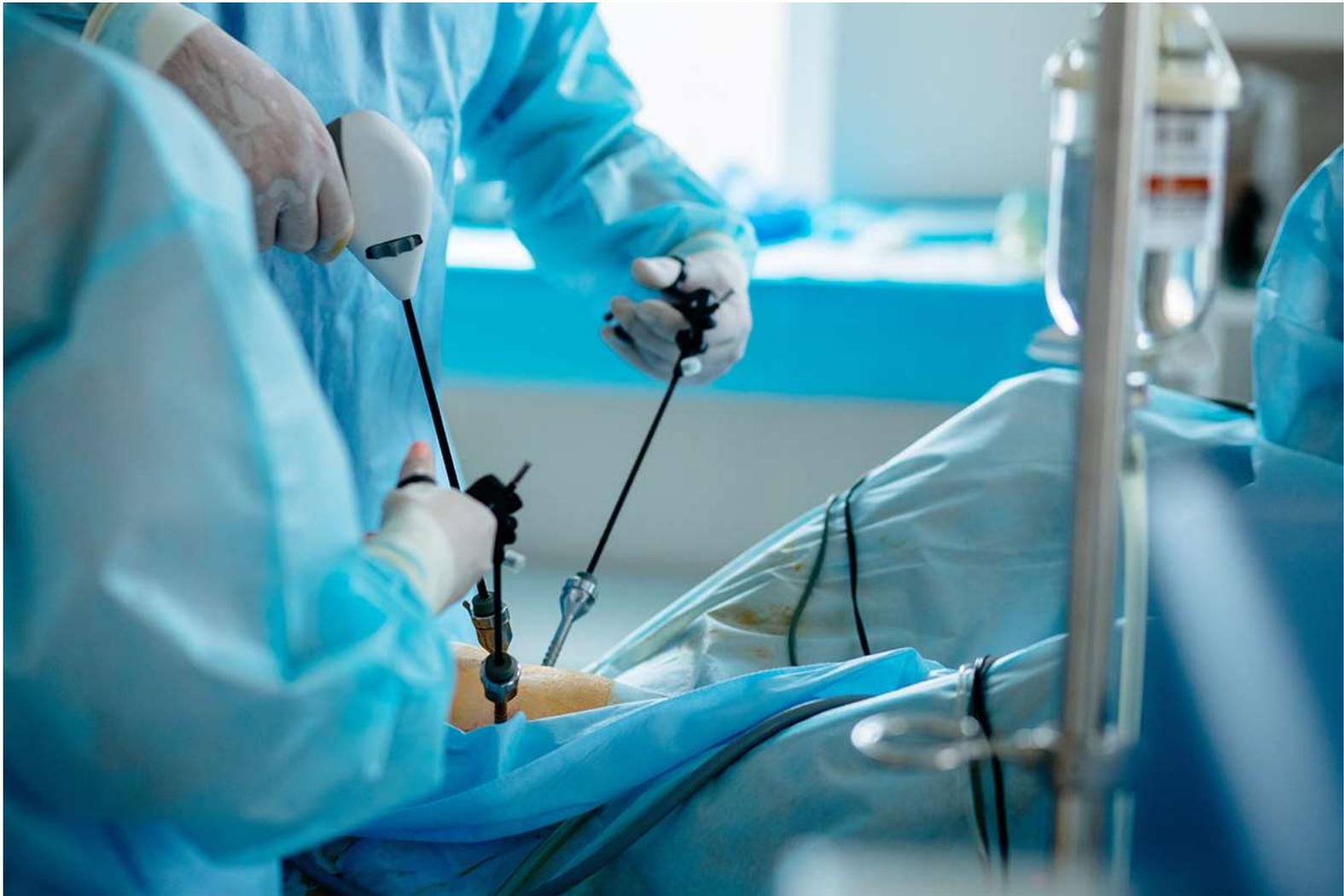


Limitations

- Reliance on remote vision and operating
 - Loss of tactile feedback
 - Dependence on hand–eye coordination
 - Difficulty with haemostasis
 - Reliance on new techniques
 - Extraction of large specimen
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Procedure

- Abdomen is insuffled with 5 to 6 litre of CO₂ to:-
 - create working space.
 - allow lens to focus on target tissue.
- Instrument is inserted through an incision in abdominal wall through an air tight trocar.
- This port have gasket that seal around the instrument maintaining the positive pressure and working space.
- Surgeons rely on texture and compressibility to evaluate tissue character and pathology.



Preoperative evaluation

Preparation of the patient

Although the patient may be in hospital for a shorter period, careful preoperative management is essential to minimise morbidity.

Preparation for laparoscopic surgery

- Overall fitness: cardiac arrhythmia, emphysema, medications, allergies.
- Previous surgery: scars, adhesions.
- Body habitus: obesity, skeletal deformity.
- Normal coagulation.
- Thromboprophylaxis.
- Informed consent.

History

Patients must be fit for general anaesthesia and open operation if necessary.

Potential coagulation disorders (e.g. associated with cirrhosis) are particularly dangerous in laparoscopic surgery.

adhesions, previous abdominal operations or peritonitis should be documented.

Examination

- Routine preoperative physical examination is required as for any major operation.
- in general, laparoscopic/thoracoscopic surgery allows quicker recovery, it may involve longer operating.
- Severe chronic obstructive airways disease and ischaemic heart disease contraindicated in laparoscopic approach.
- jaundice, abdominal scars, palpable masses ,tenderness or obesity .

GENERAL INTRAOPERATIVE PRINCIPLES

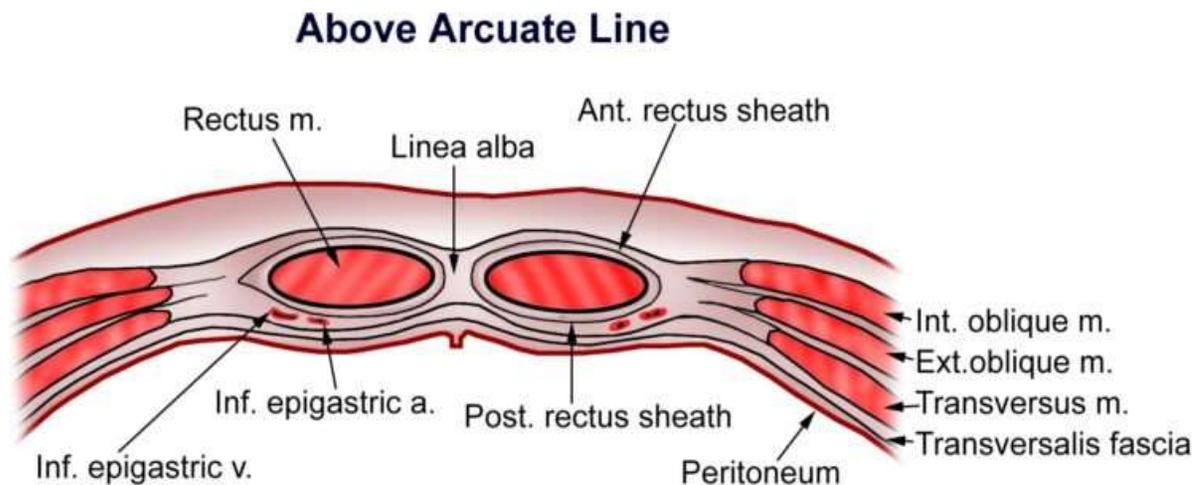
- **Creating a pneumoperitoneum**
- **Preoperative problems:**
 - ✓ Previous abdominal surgery
 - ✓ Obesity
- **Operative problems:**
 - ✓ Intraoperative perforation of a viscus
 - ✓ Antibiotics
 - ✓ Bleeding

Creating a pneumoperitoneum

- There are two methods for creation of a pneumoperitoneum:
 1. Closed method
 2. open method
- **The closed method:**
 - involves blind puncture using a **Verres needle**.
 - this method is fast and relatively safe.
 - there is a small but significant potential for intestinal or vascular injury on introduction of the needle or first trocar.

- **Open method (Hasson approach):**

- avoids the morbidity related to a blind puncture.
- Definite and small risk of bowel injury
- Useful in patients with abdominal surgery or underlying adhesions
- To achieve this, a 1 cm vertical or transverse incision is made at the level of the umbilicus.



The umbilicus carries importance as it is a reliable **anatomical landmark** deriving from the embryological coalescence of the rectus sheath and peritoneum and is devoid of other myofascial planes that could complicate subsequent entry into the peritoneum

Preoperative problems:

1. Previous abdominal surgery:

- Not a contraindication
- assess the type and location of surgical scars
- Open method for insertion of the first trocar is safer
- Laparoscope used to as blunt dissector to traverse through adhesions by careful pushing and twisting motion under direct vision

2. Obesity:

Technically difficult on creating pneumoperitoneum-(due to increased thickness of subcutaneous fat)

- accessing operative region and achieving good exposure in presence of an obese colon

- **Overcome difficulties by:**

- 1) Use large supra umbilical incision (1-3 cm)
- 2) Direct verres needle at right angle to skin(if closed method used)
- 3) Hasson method preferred
- 4) Use larger and longer instruments to reach operative site

Operative problems

❑ Intraoperative perforation of viscus

- Perforation of any viscus, such as : Bowel, solid organs and blood vessels
- more common with the laparoscopic technique than with the open technique
- it does not appear to be a factor in increasing the early postoperative morbidity
- Best is to avoid with utmost care and precision

❑ Antibiotics:

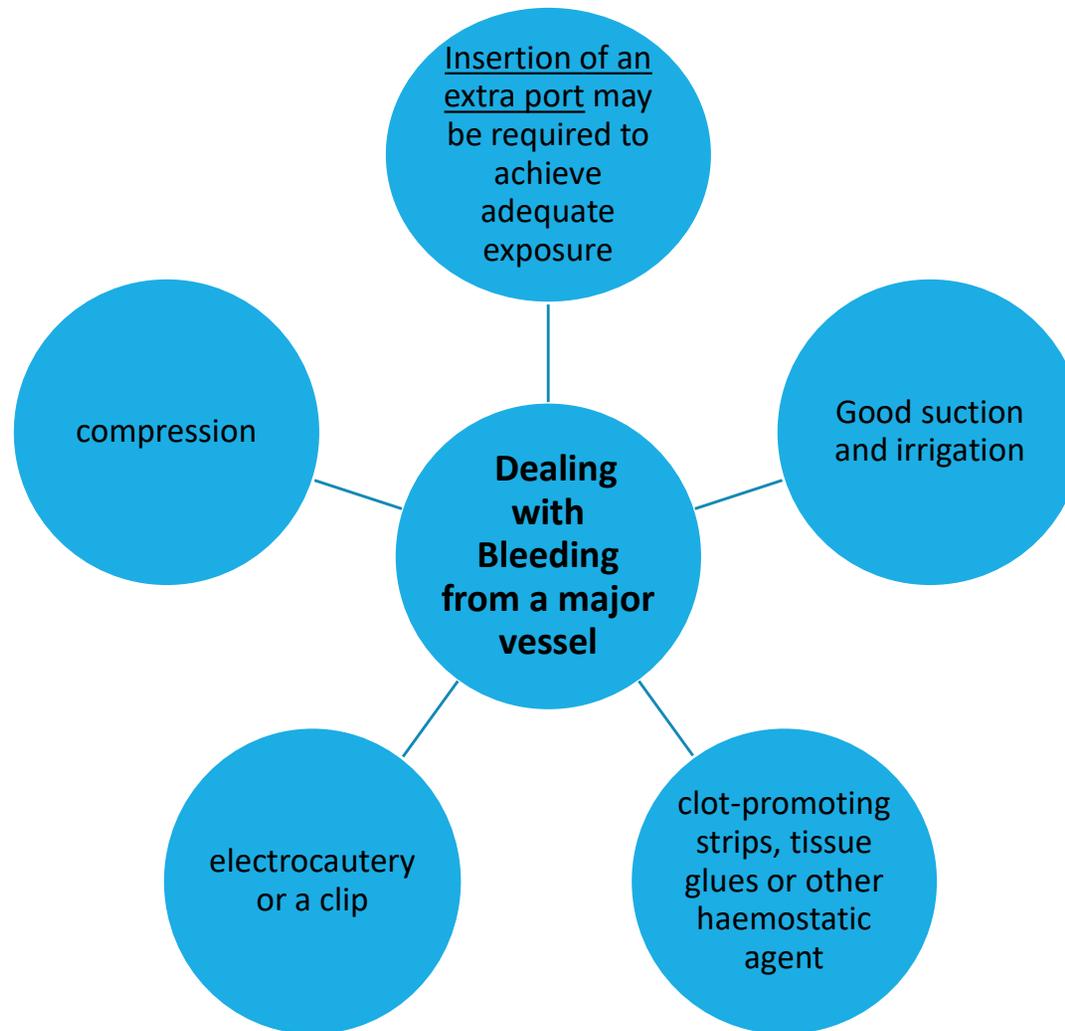
- Prophylaxis within 1 hour of skin incision
- Established sepsis or septicemia not recommend for MIS except for removing foci of infection

❑ Bleeding

- Most common cause to conversion to open surgery
- Limits the field of operation
 - Obscures the operative field
 - Magnification confuses small arterial bleed as the significant hemorrhage
 - Light absorption obscures the visual field

- **Bleeding from a major vessel**

- Damage to a large vessel requires immediate assessment of the **magnitude and type of bleeding**:
 - When the bleeding vessel is identified, a fine-tip grasper can be used to grasp it and apply either electrocautery or a clip, depending on its size.
 - When the vessel is not identified early and a pool of blood forms, compression should be applied immediately .
- Good suction and irrigation are of utmost importance. Once the area has been cleaned, pressure should be released gradually to identify the site of bleeding.
- **Although most bleeding vessels can be controlled laparoscopically .**
- **If at any stage bleeding is difficult to stem laparoscopically, there should be no delay in converting to an open procedure in the interests of patient safety.**

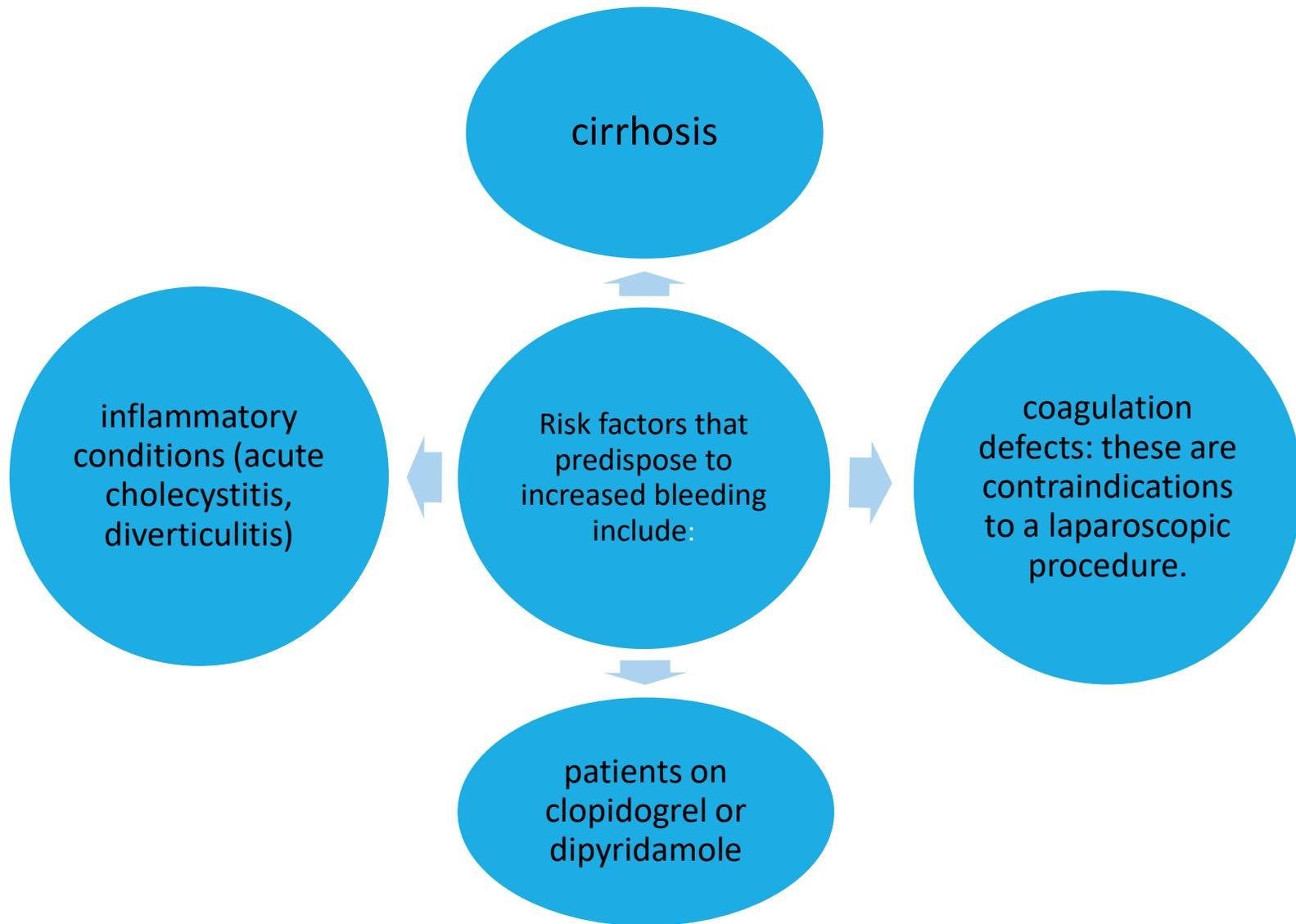


Bleeding from organ

- Can be prevented if dissection is done in correct plane
- If bleeding from organ is noted → dissection is extended to locate the bleeding point → electrocautery → hemostasis
- Bleeding persists → bleeding point grasped with insulated grasper → electrocautery applied to grasper to achieve the hemostasis

Bleeding from the trocar sites

- Bleeding from the trocar sites is usually controlled by applying upwards and lateral pressure with the trocar itself.
- **Considerable bleeding may occur by:**
 - the **falciform ligament** is impaled with the substernal trocar
 - one of the **epigastric vessels is injured**
- If significant bleeding occurs apply pressure or suture
- Pressure applied with foleys catheter entered into trocar site inflate balloon maintain in traction → keep for 24 hours and remove



EVACUATION OF BLOOD CLOTS

clot formation takes place when unsuspected bleeding occurs or when inflammation is severe

1. The best way of dealing with blood clots is to **avoid them**.
2. The routine use of 5000–7000 units of **heparin** per litre of irrigation fluid helps to avoid the formation of clots.
3. When extra bleeding is foreseen, a **small pool of irrigation fluid** can be kept in the operative field to prevent clot formation.
4. After clots have formed, a **large bore suction device** should be used for their retrieval

Principles of electrosurgery during laparoscopic surgery:

- Electrosurgical injuries during laparoscopy are **potentially serious**.
- The overall incidence is between one and two cases per 1000 operations.
- Electrical injuries are usually unrecognized at the time that they occur, with patients commonly presenting **3–7 days after injury** with complaints of **fever and abdominal pain**.

POSTOPERATIVE CARE

The postoperative care of patients after laparoscopic surgery is generally straightforward, with a low incidence of pain or other problems.

The most common routine postoperative symptoms are upper abdominal pain, nausea and pain around the shoulders.

If the patient develops a fever or tachycardia, or complains of severe pain at the operation site we know that something is wrong and close observation is necessary.

routine investigation should include a full blood count, C reactive protein (CRP) measurement, liver function tests, an amylase test and, probably, an ultrasound scan of the upper abdomen to detect fluid collections.

If bile duct leakage is suspected, endoscopic retrograde cholangiopancreatography (ERCP) may be needed.

If in doubt, relaparoscopy or laparotomy should be performed earlier rather than later because Death following technical errors in laparoscopic cholecystectomy has often been associated with a long delay in deciding to re-explore the abdomen.

In the absence of problems, patients should be fit for discharge within 24 hours.

Most common postoperative symptoms :

1-Nausea

- 50% of cases
- Managed with antiemetics
- Controlled within 12-24 h
- Avoid opiate analgesics

2- Shoulder tip pain

- Referred from diaphragm, worst 24 h after operation.
- Settles within 2–3 days and is relieved by simple analgesics, such as paracetamol.

3- abdominal pain

- port site pain and is worse if there is haematoma formation.
- Increasing pain after 2–3 days —————> suspect infection

Herniation through port site may produce localized pain.

- If increasing pain , tachycardia and or pyrexia —————> review the case and relaparoscopy should be considered.

Oral fluids

- Started 4–6 hours after the end of the operation except in colectomy or small bowel resection .

Oral feeding

- a light meal can be taken 4–6 hours after the operation. Some patients remain slightly nauseated at this stage, but almost all eat a normal breakfast on the morning after the operation.

Urinary catheter and drains

- Foleys if applied remove after procedure.
- Drain applied to assess :
 - 1- Postoperative blood loss
 - 2- Nature of intraperitoneal fluid
 - 3- Postoperative monitoring needs
- Drain if placed to peritoneal fluid → remove within 1 hour after operation.
- If placed for hepatic bleeding or bile leakage → remove when drain has achieved its function (after 12-24 hours)
- If continued blood loss from drain → re-explore the abdomen

DISCHARGE FROM HOSPITAL

- Patient discharge is based on clinical indicators and their fitness for recuperating in a non-hospital environment.
- One of the advantages for the application of minimally invasive surgery is an earlier recovery and therefore discharge from hospital.
- For the common laparoscopic procedure of cholecystectomy, most surgeons discharge a laparoscopic cholecystectomy patients on the day of surgery, but some are kept in overnight and discharged the following morning.
- Patients should not be discharged until they are seen to be comfortable, have passed urine and are eating and drinking satisfactorily. They should be told that if they develop abdominal pain or other severe symptoms they should return to the hospital or to their general practitioner.

Mobility and convalescence

- Patients can get out of bed to go to the toilet as soon as they have recovered from the anaesthetic.
- patients can cough actively and clear bronchial secretions, and this helps to diminish the incidence of chest infections.
- Many patients are able to walk out of hospital on the evening of their operation and almost all are fully mobile by the following morning. Thereafter, the postoperative recovery is variable.
- The average return to work is about 10 days.

FURTHER DEVELOPMENTS THAT HAVE MADE MINIMALLY INVASIVE SURGERY EVEN LESS INVASIVE

- 1) Single incision laparoscopic Surgery
- 2) Natural orifice transluminal endoscopic surgery
(NOTES)



THANK YOU

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