SURGERY

Level 3 - Semester 6

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Harvard
Printing center

Laparoscopic Instruments

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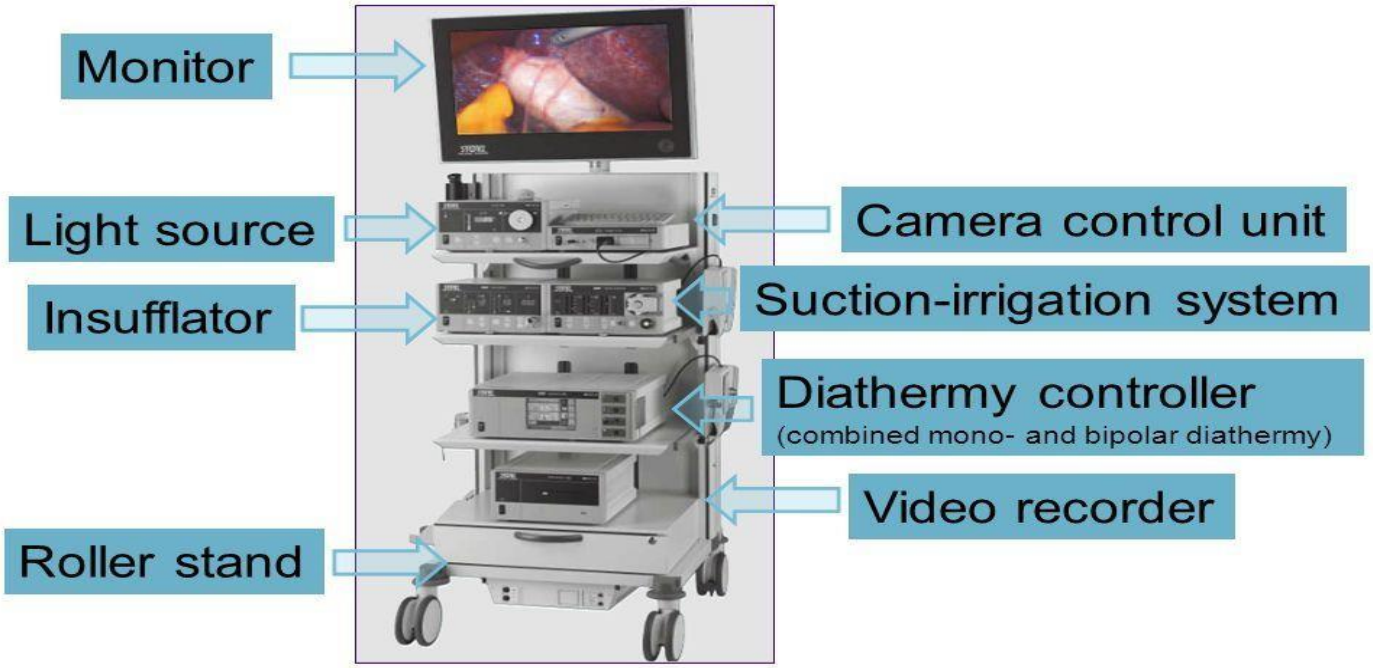
LAPAROSCOPIC INSTRUMENTS

Department of Surgical Research and Techniques

Laparoscopic Tower

5th Practical



Introduction

- **Laparoscopic surgery, also called minimally invasive surgery (MIS):**
  - A modern surgical technique in which operations are performed far from their location through small incisions (usually 0.5-1.5 cm) elsewhere in the body.
- **Three main components:** ❸
  1) Image production.
  2) Pneumoperitoneum.
  3) Laparoscopic instruments.

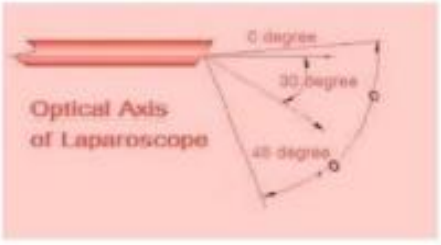
Laparoscopic Instrumentation

1. Optical Devices.
2. Equipment for creating/maintaining domain.
3. Instruments for Access.
4. Operative instruments.
5. Energy sources.
6. Tissue approximation/hemostasis.
7. Miscellaneous.

1. Optical Devices:

1) Telescope:

- This endoscope is made of surgical stainless steel containing an optical lens.
- Telescopes or laparoscopes come in various sizes 10mm, 5mm, 2-3mm 'needle scopes' and with various visualization capabilities such as zero-degree forward viewing, 30- or 45-degree telescope, zero degree

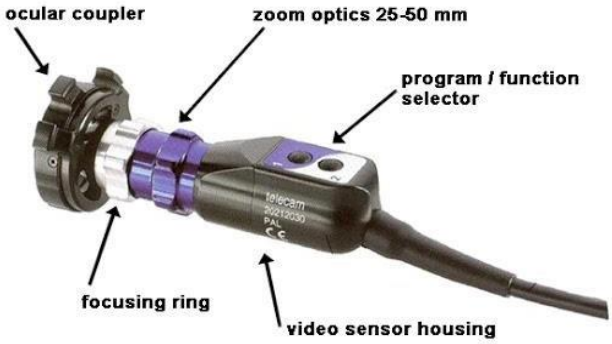


2) Light Source:

- White light illumination is provided from a high intensity xenon, mercury, or halogen lamp and delivered via A fiberoptic bundle. **MCQ**

3) Video Camera:

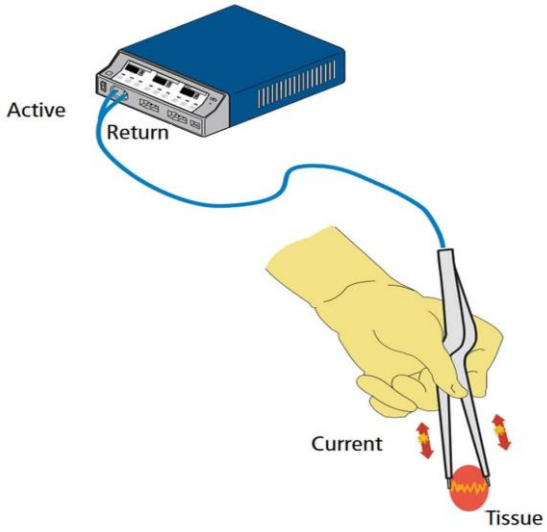
- The resolution or clarity of the image depends upon the number of pixels or light receptors on the chip.
- Standard cameras in laparoscopic use contain 250,000 to 380,000 pixels.

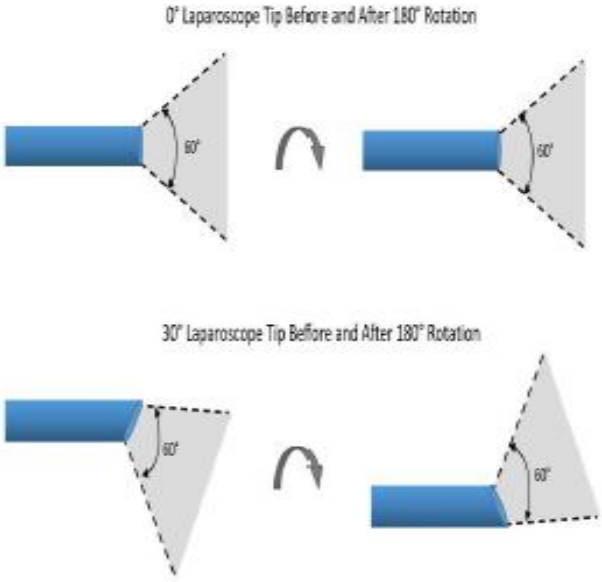


4) Television Monitor:

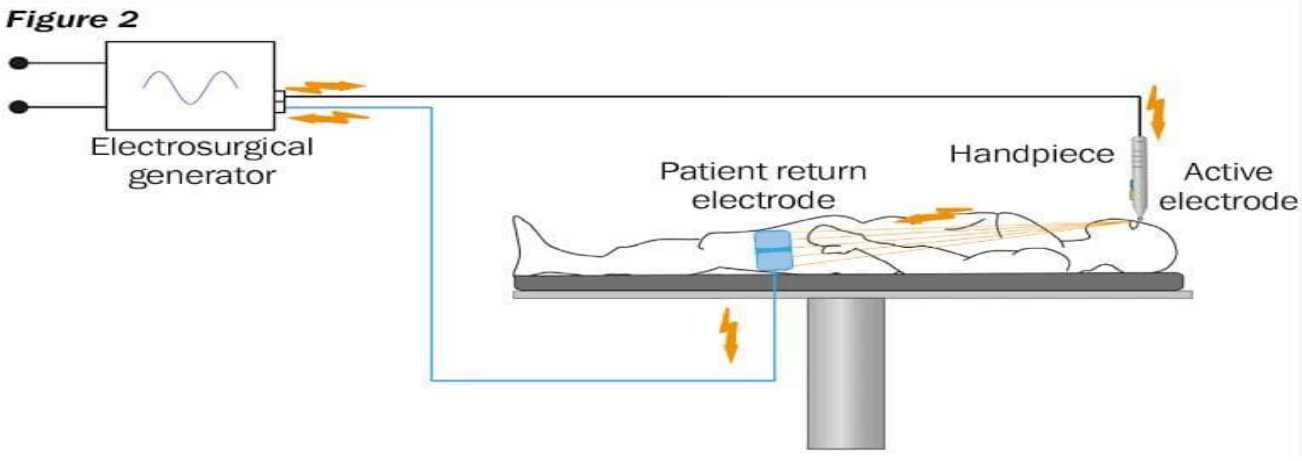
- High-resolution video monitors are required for suitable reproduction of endoscopic image.
- Three chip cameras require monitors with 700 lines resolution to realize the improved resolution of extra chip sensors.

- VHS recorder, video printer and sometimes DVD recorder are standard documentation equipment housed in the video cart.





Zero degree vs 30 degree telescope



2. Equipment for creating/maintaining domain:

Gas insufflation: "MCQ"

- CO_2 Insufflator: The creation of working space in the abdominal cavity is generally done using CO_2 delivered via an automatic, high flow, pressure regulated insufflator.
- **Q: CO_2 is currently the agent of choice due to ???**
  1) Low risk of gas embolism.
  2) Low toxicity to peritoneal tissues.
  3) Low cost.
  4) Rapid reabsorption.
  5) Inhibits combustion.
- Level is usually set at 12 to 15 mm Hg.

3. Instruments for Access:

Veress needle:

- The Veress needle is designed to create pneumoperritoneum prior to insertion of trocar in a closed fashion.

4. Operative Instruments:

1. Trocars:

- Available in various diameters and sizes according to requirements, 10mm and 5 mm being commonly used.

2. Graspers:

- Retraction may be achieved using large instruments.

3. Dissectors:

- Maryland Dissector has long, curved jaws with fine tapered tips. Ideal for precise dissection (resembles the Crile hemostatic clamp used in open surgeries.)

4. Scissors:

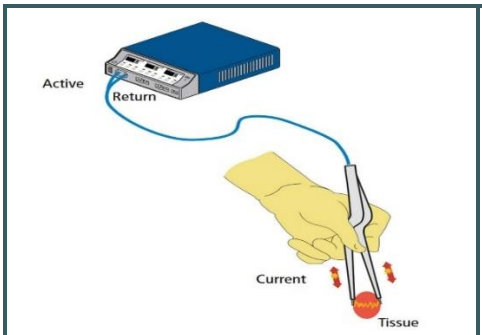
- There are a variety of scissors for dissecting, mobilizing and cutting tissues, which include straight and curved types.

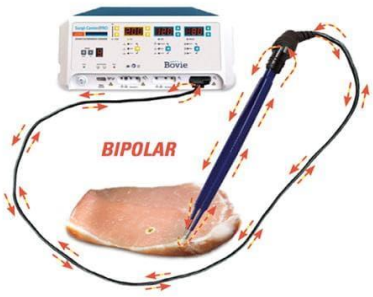
5. Energy Sources

1. Electrosurgery:

- Electrocautery refers to direct current whereas electrosurgery uses alternating current.
- During electrocautery, current does not enter the patient's body. Only the heated wire comes in contact with tissue.

Bipolar	Monopolar
✦ In bipolar electrosurgery, both the active electrode and return electrode functions are performed at the site of surgery. ✦ The two tines of the forceps perform the active and return electrode functions. ✦ Only, the tissue grasped is included in the electrical circuit.	✦ The active electrode is in the wound. ✦ The patient return electrode is attached somewhere else on the patient. ✦ The current must flow through the patient to the patient return electrode to complete the circuit.





2. Ultrasonic Energy: (The Harmonic scalpel):

- Uses ultrasonic technology, the unique energy form that allows both cutting and coagulation at the precise point of impact, resulting in minimal lateral thermal tissue damage.
- Cuts and coagulates by using lower temperatures than those used by electrosurgery or lasers.

6. Instruments for Tissue approximation/ Hemostasis:

1. Needle holder:

2. Endo-stitch:

3. Clip Applicators:

- Clip appliers are primary modality for ligating blood vessels and other tubular structures.

4. Mechanical Stapling Instruments:

- Laparoscopic staplers are modifications of stapling devices of open surgery.
- Staplers are used for transecting and anastomosing bowel, transecting mesentery etc.

7. Miscellaneous:

1. Aspiration/Irrigation probes:

- These are essential for most laparoscopic procedures in order to maintain a clear operative field.
- Irrigation and aspiration channels may be incorporated into surgical instruments but working channels are small and subject to repeated clogging.

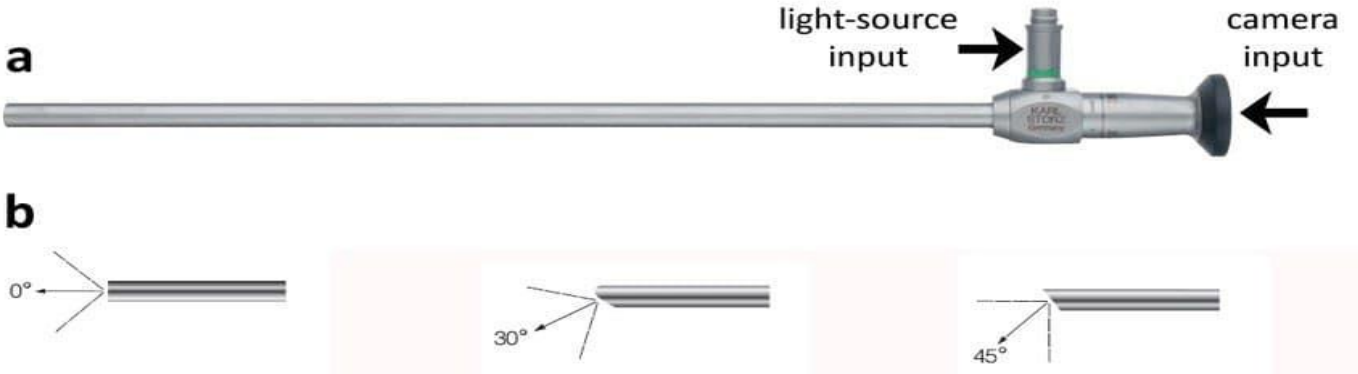
2. Organ Extraction devices:

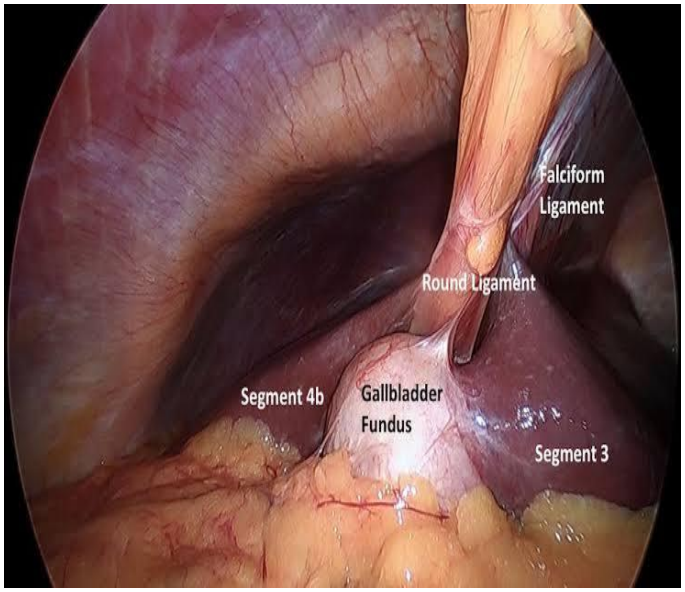
- **Preloaded specimen retrieval pouches:**
  - Made of strong material, which is impervious to cancer cells. The mouth of the pouch is bought out of the incision site and opened following which the specimen is extracted.

- **Tissue Morcellators:**
  - These are used to reduce the size of the resected specimen prior to retrieval.
  - It may render pathological examination more difficult.
  - E.g. Laparoscopic myomectomy.

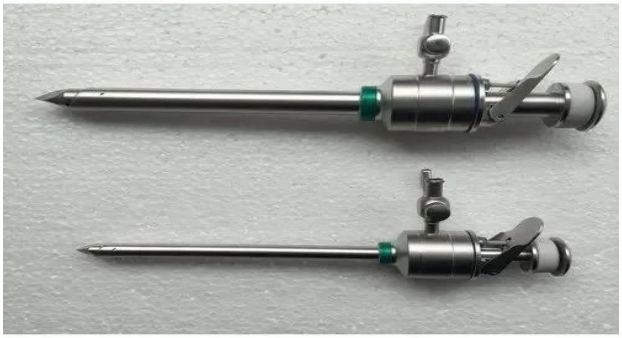
Maryland forceps

Grasper





Insertion of veress needle

	
Maryland forceps	Trochar (disposable 5 mm and 12 mm)
	
Trocar (metal 4mm and 10 mm)	Grasper
	
Grasper (non traumatic)	Trocar (sheath and needle)