Principles of Laparoscopic surgery

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What are the main pillars to do/perform laparoscopic procedure?

Advantages of minimally invasive surgery

which mean :
- Scar become 1cm
- Minimal pain
- Early recovery

- Less pain
- Early recovery
- Early return to work
- Better cosmetic
- Can get same outcome of standard approach

SURGICAL TRAUMA OPEN VS LAPAROSCOPIC

- Both has same surgery stress response

  Cause there is a wound eventually no mater how big is it

- More wound stress with open

- More respiratory and cardiac with laparscopic

Stress response mean :
When cortisol and aldosterone will increase and immunity will be stimulated

But the difference is pain will be less

Limitations of laparoscopic approach

- Loss of tactile sensation — your hand is not inside , you won't feel the organ
- Need brain training — To decide that the feel of organ by eye (like Chinese stick)
- Need further training
- Hospital administration and IT support
- Contra-indications:
  - 1- Patient can not get general anesthesia — You can't do it under spinal or epidural block
  - 2- Frozen abdomen, — the whole abdomen is adhese no place to work
  - 3- Tumor size limitations
  - 4- Others — Depend on your hospital

Main principles of LS

- Same anatomy and surgical steps as open
- Recognize the content of **Laparoscopic Tower**

  Next slides
- **Up date your self about Laparoscopic Instruments (Disposable vs non-disposable, size and length…)**

  All instrument are longer than the opening procedure
- **Standard roles for applying trocars**

we need to make skin incision then put the trocar lastly put the instrument cuz if we do the opposite it will be hard for me to enter the instrument cuz the muscle will contract

First principle of LS

- Never introduce or violate known anatomy
- Do the scientific approved surgical steps
- Only , difference is **the approach**

  incision will change from 12cm to 1cm with putting the magnification I will see as if i open an 12cm

Main pillars of any Laparoscopic procedure: **2 (L T)**

: Laparoscopic Tower

they may ask u in OSCE
what is LT ; mention the 3

- **Gas** : as we separate the roof from floor
  there are operations which are Gasless; by separating muscle

  to create space (**air**, water, non)
- **Light**:

  to illuminate the space
- **Camera** :

  to transmit the picture to the screen

LT CONTENT

GAS

Non-toxic, easy absorbable, non diffusible, feasible, Cheap, non-explosive, non reactant

- Colorless, odorless,……(10 features)
- Gases (11) : O, F,N,H,CL,HE,NE,AR,KR,XE,RN
- Air, oxygen, CO2, nitrous oxide, inert gases
- Insufflator: Flow 40 L/min ,

12-15 is NORMAL

as motor; pump gas to abdomen

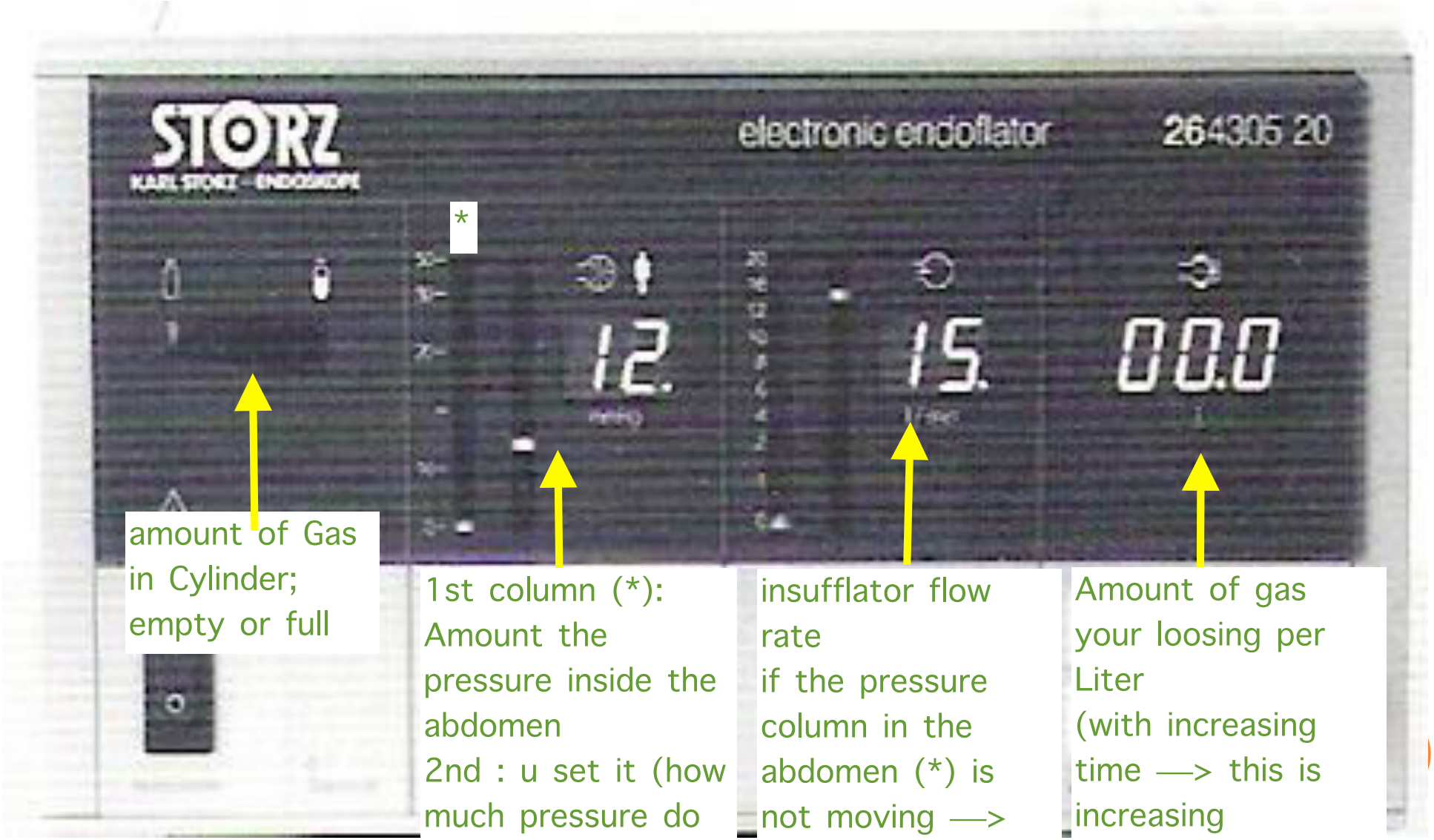
Set your pressure, mmHg **(15)**

Observe recording pressure

- trouble shooting: no space and high pressure

no space and high flow

INSUFFLATOR



Light source

- High intensity bulbs, Xenon, mercury, halogen
- 175-300 watt
- Trouble shooting: Dark field
- **Turn on the light before white balance**

where light come out

IMAGING SYSTEM

- Camera, laparoscope, monitor
- Camera magnifies the endoscopic view 15 fold
- Laparoscope: a rigid rod-lens and light conducting cable, Length (32,42 cm), Diameter (2,5,10 mm), Degree (0, 30, 45)
- Monitor has to be 19 inches or larger , same site of the operated organ
- Trouble shooting: no picture

Scope

Camera

the head is so big and the cord is flexible —> I can't put inside the abdomen
So I connected with scope (next slide)

SCOPES

申达 SHENDA SIAO

Gold Supplier

Different length and Dimeter

Laparoscope Endoscope

SD-301.001	0°	Φ10×330	SD-301.002	30°	Φ10×330
SD-301.003	0°	Φ5×330	SD-301.004	30°	Φ10×330

CE 1282 FDA 10044735 nqa. ISO 13485 Registered UKAS QUALITY MANAGEMENT 015 28903

Scoops 2

angle 0

angle 30 or 45

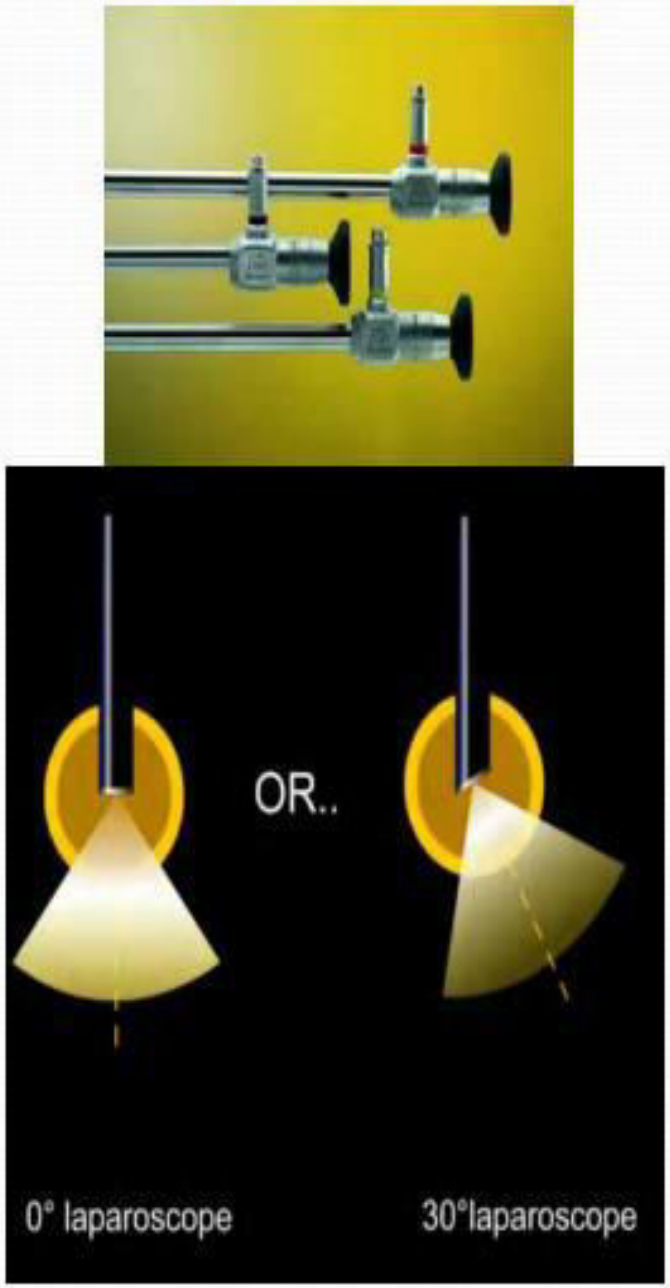
Telescope

- There are three important structural differences in telescope available

1. 6 to 18 rod lens system telescopes are available

2. 0 to 120 degree telescopes are available

3. 1.5 mm to 15 mm of telescopes are available



Screens

How to introduce Pneumopertoneum

Gas in peritoneum =

- Open technique (Hasson)
- Opti-view
- Veress needle going blind

Veress Needle

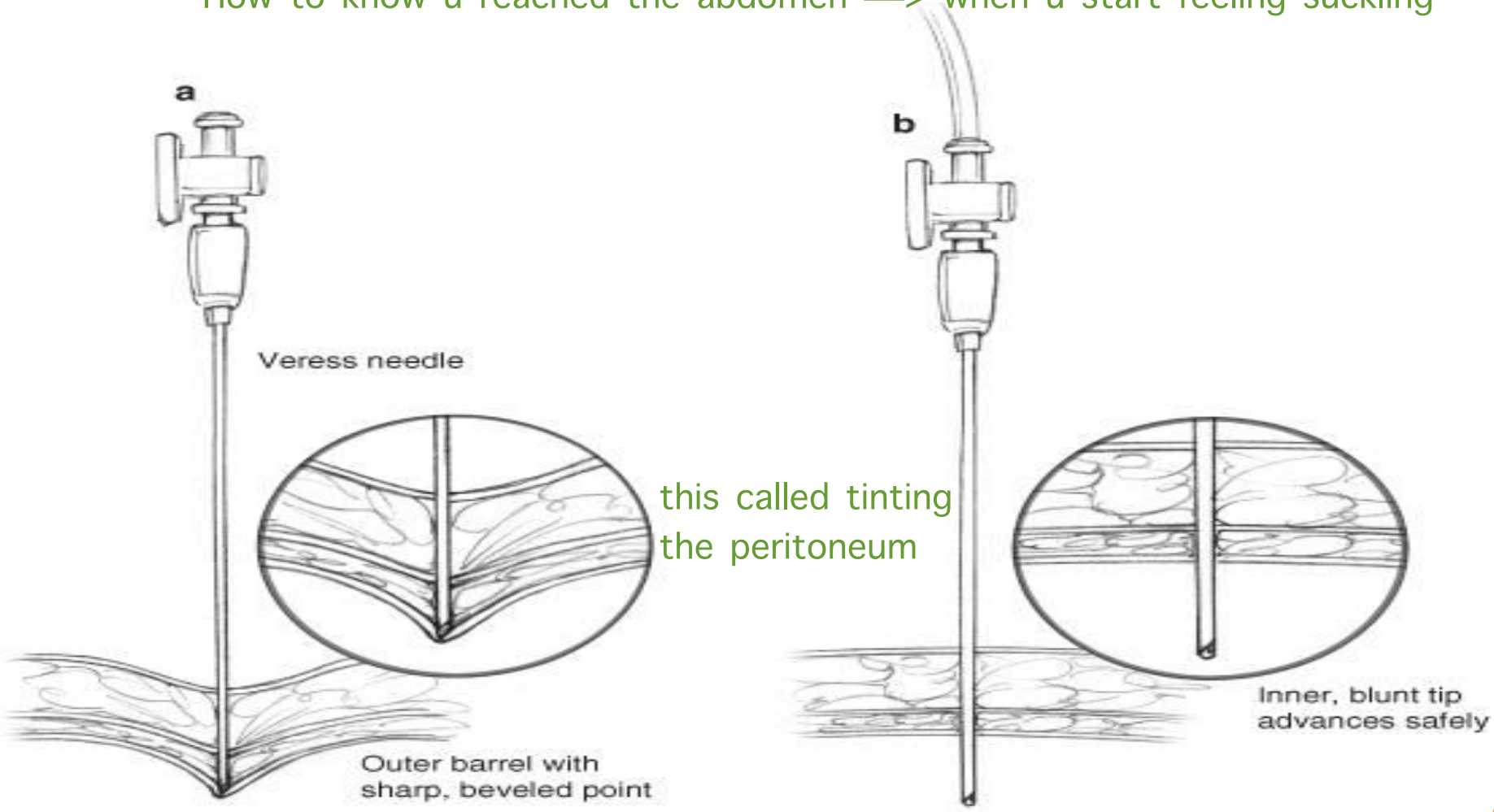
- (1938)
- three length 80mm, 100mm, 120mm
- 14-gauge
- Maximum flow rate is 2L/min

  = how much gas is going through needle diameter it could reach to 2.5L while trocar can take up to 15L/m

MCQ; Most common injury by needle or trocar is the small bowl NOT vascular

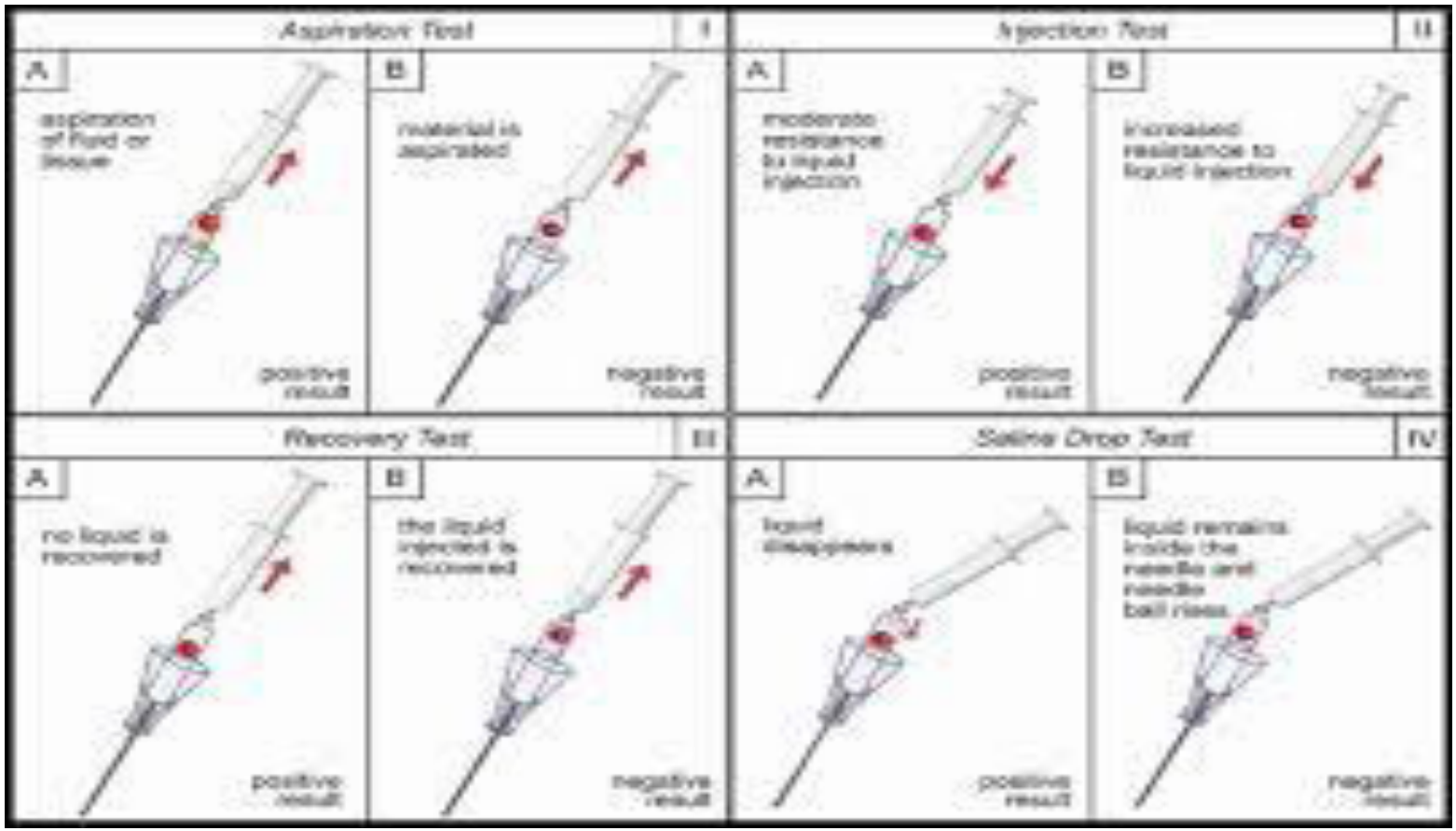
V N = Needle sufflate gas

How to know u reached the abdomen —> when u start feeling suckling



this called tinting the peritoneum

V N



Do drop test to ensure you are inside

Optiview

- A technique which uses cannula and 0 degree telescope to allow direct visualization of the entry tract. Specialist cannula such as Visiport or **Optiview** uses this

Opti view

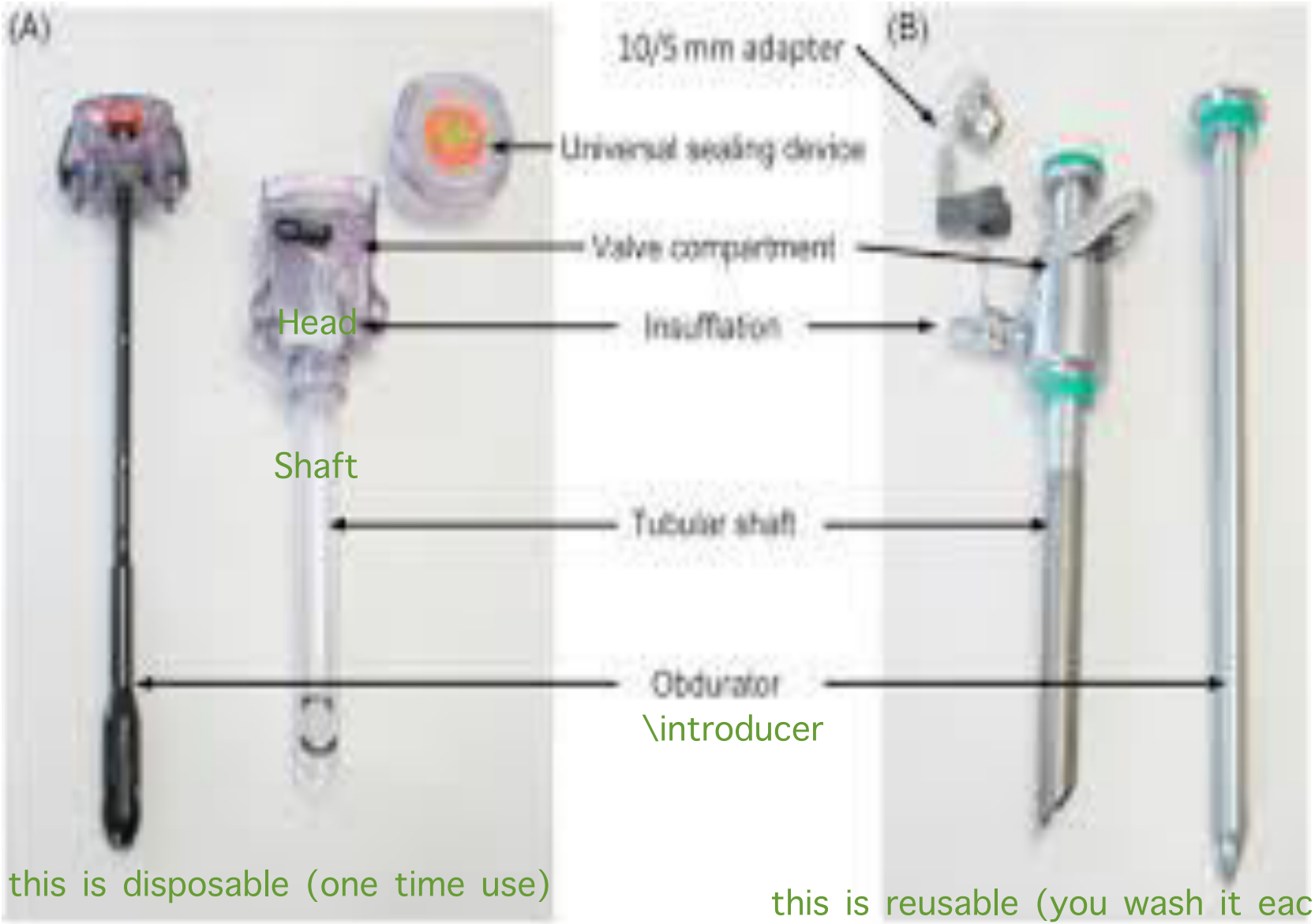
Trocars & Instruments

- Trocar: it contain; shaft, head, introducer,
- Diameter 2-5-15mm
- Length 8cm-42cm
- Bladed, bladeless
- Disposable vs NON

- **How to decide for your trocar?**

we insert shaft inside the introducer then we start to insert it inside the abdomen (introducer will cut the abdomen muscle), when we reach the peritoneum we remove the introducer while keeping the shaft to be easy for us inserting other instrument (cuz abdominal muscle will contract then your going to need to perforate each time you insert an instrument)

TROCARS 1



this is disposable (one time use)

this is reusable (you wash it each time)

TROCARS 2

Diffrent diameter same lenghth

TROCARS 3

Trocars

we use the splitting not cuttor

- Types:
  - Cutting
    - Pyramidal tipped
    - Flat blade
  - Noncutting
    - Pointed conica
    - Blunt conical
    - Optical

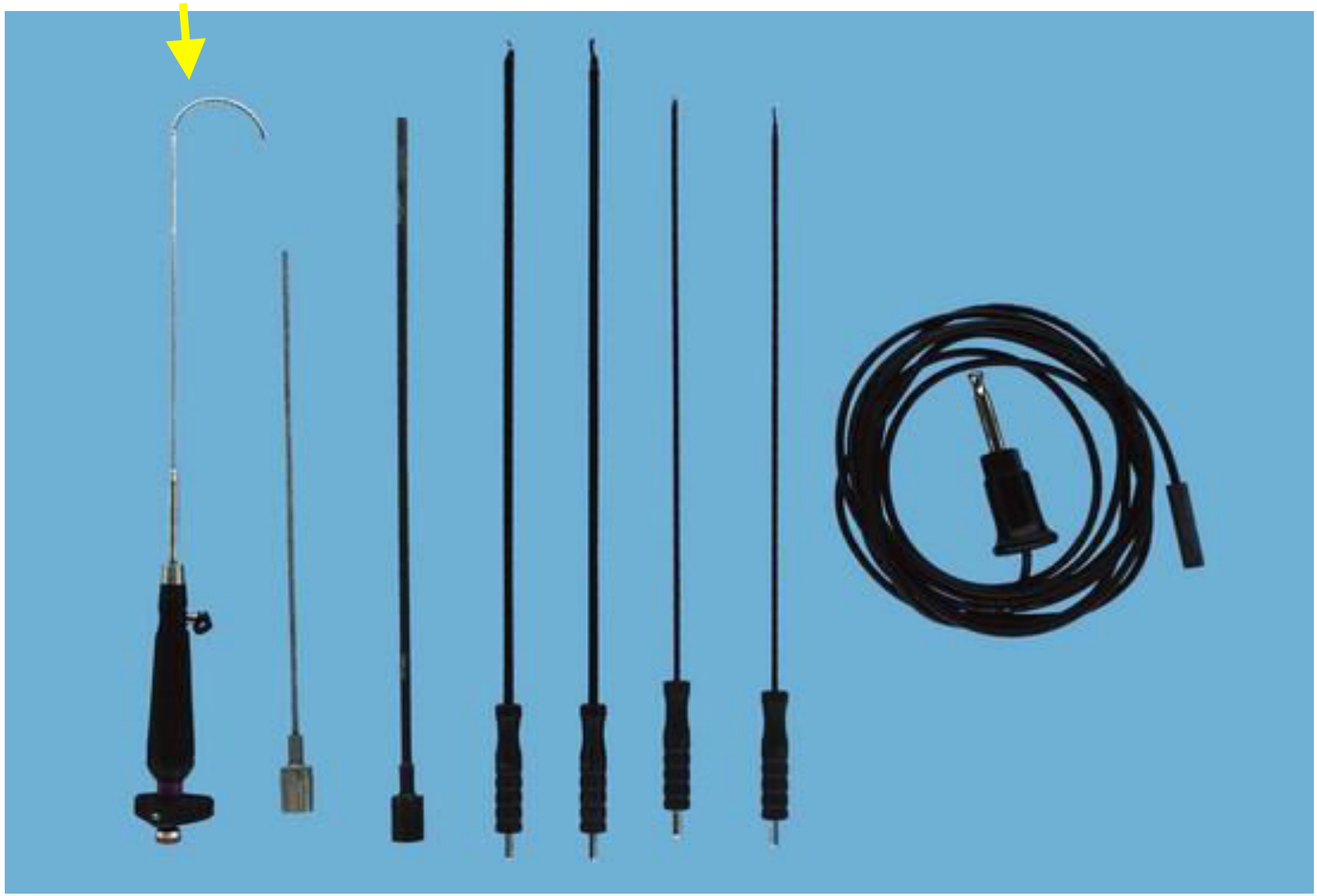
cut the fiber

this is plastic conical head -> splitting the fiber

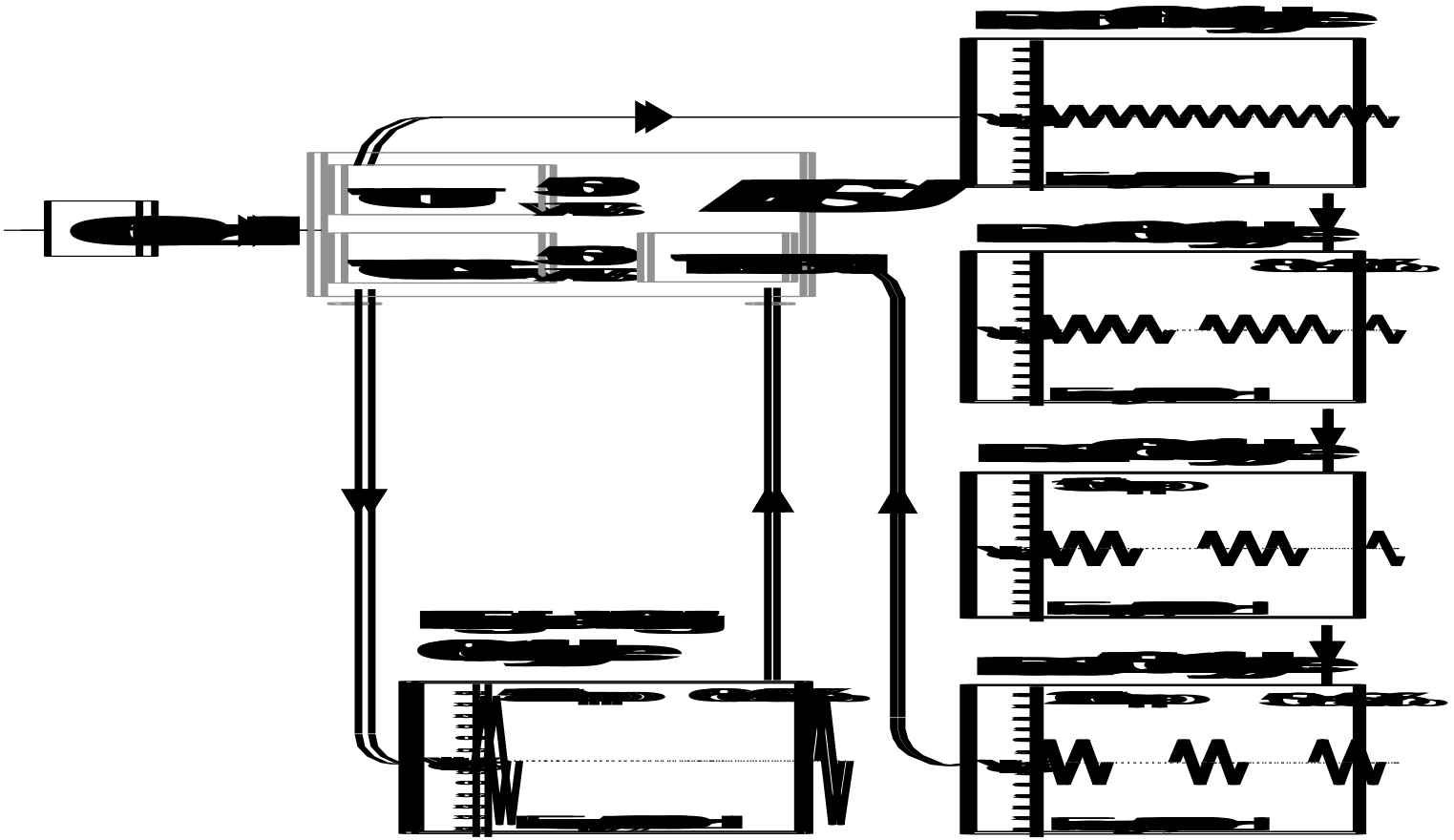
LAPAROSCOPIC INSTRUMENTS

SEALING & **CUTTING** & **CAUTERY**

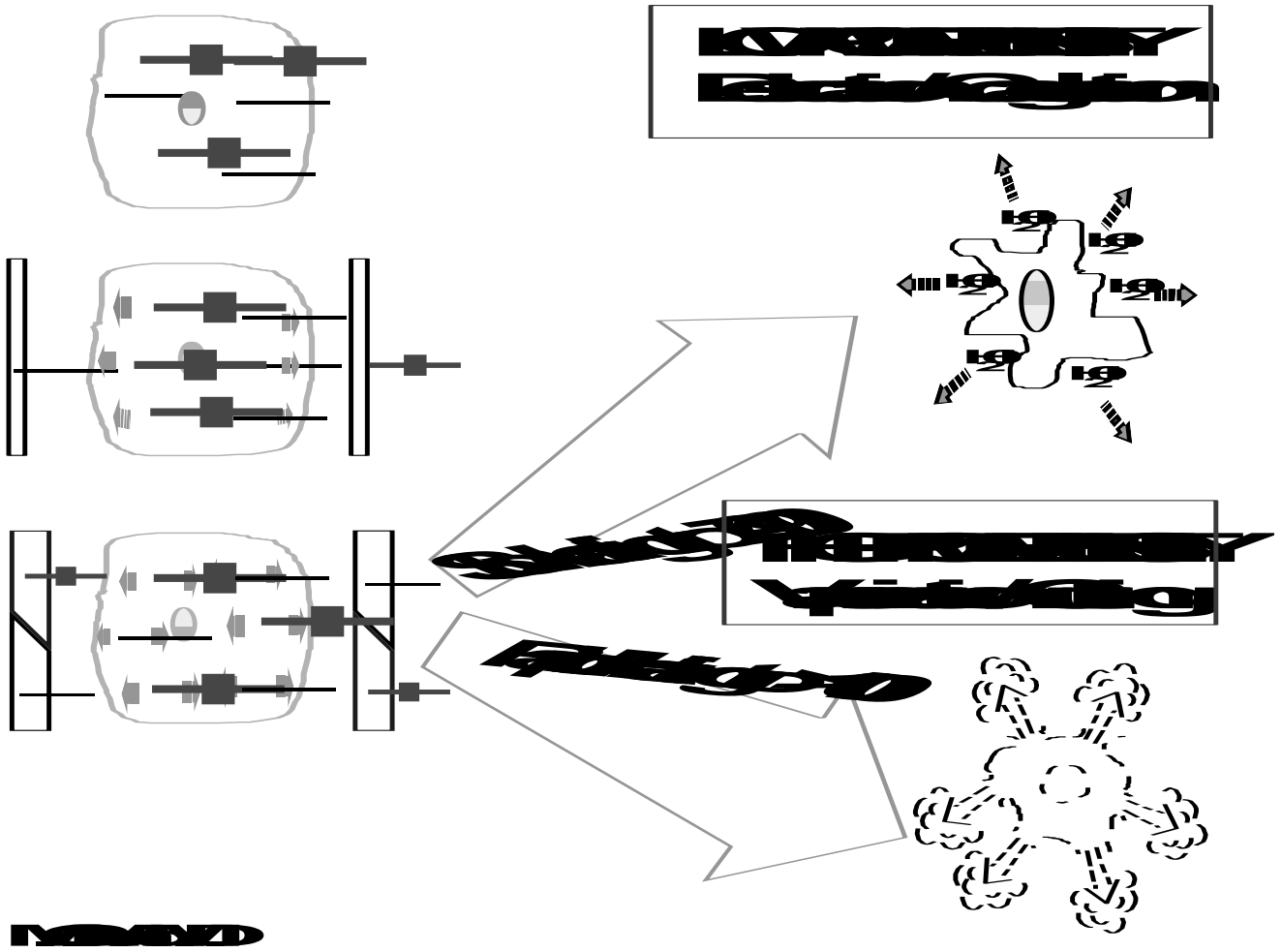
Mono polar L hook; using electricity by producing frequancies to cut the tissue



Current Waveforms



Cellular Effects



ULTRA-CISION/HARMONIC SCALPEL

using electricity by producing ultrasonic wave or harmonic to cut the tissue

- Ultrasonically activated device that move at an imperceptible 55,000 cycles/sec, cutting tissue with a cool blade
- The mechanical action denature collagen molecules, forming a coagulant and instantly sealing small vessels with minimal thermal injury

HS

LigaSure This is Bipolar

- electrothermal bipolar tissue sealing system
- In fact, the heat generated from the bipolar energy determines the fusion of collagen and elastin in the walls of the vessel with the creation of a permanent sealed zone. The system detects the thickness of tissue to be coagulated and automatically defines the amount of energy required and the delivering time

L hook; Mono polar
Ligasure ; Bipolar (2 heads)
Ultrasonic ; Hormonal scalpel

L S

LS

knife in between

LIGASURE

doctor skip

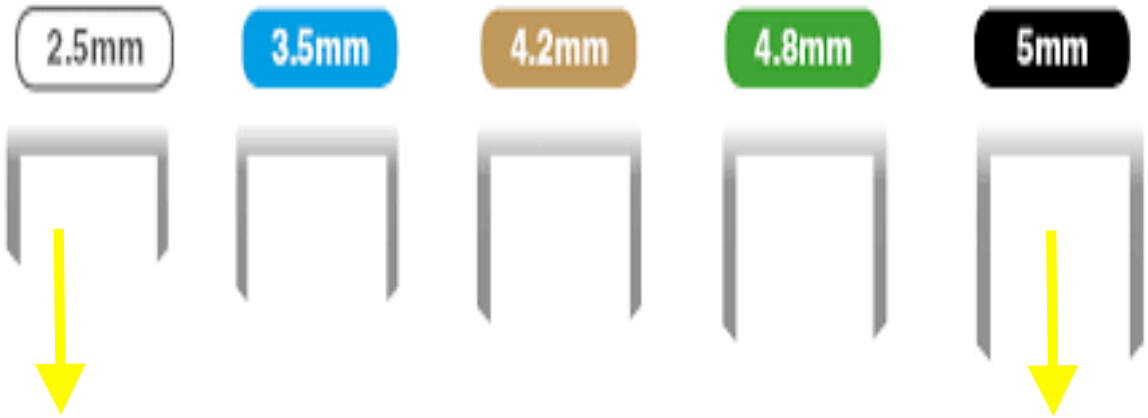
LIGASURE

- The LigaSure Vessel Sealing System allows hemostasis by vessel compression and obliteration through the emission of bipolar energy. It includes
- 1. An electrosurgical generator able to detect the characteristics of the tissue closed between the instrument jaws; it delivers the exact amount of energy needed to seal it permanently.
- 2. Several types of instruments that seal and, in some cases, divide the tissue. Those used in thoracic surgery are the following:
- LigaSure Atlas is a surgical endoscopic device (diameter: 10 mm, length: 37 cm) that seals and divides vessels up to 7 mm in diameter;
- LigaSure V is a single-use endoscopic instrument (diameter: 5 mm, length: 37 cm) able to seal and divide;
- LigaSure Lap is a single-use endoscopic instrument (diameter: 5 mm, length: 32 cm);
- LigaSure Precise is a single-use instrument (length: 16.5 cm) for open procedures specifically designed to provide permanent vessel occlusion to structures that require fine grasping;
- LigaSure Std is a reusable instrument;

LAPAROSCOPIC STAPLERS

color depend on the lenghth of the stables

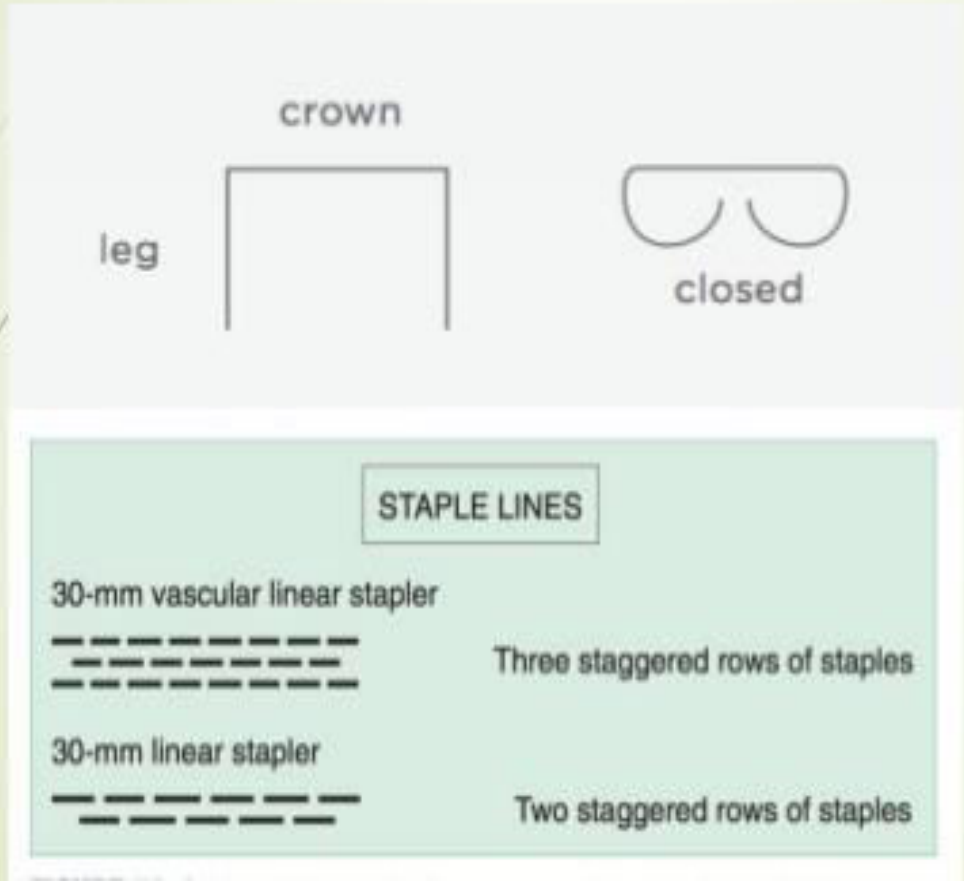
Base are same but the limb/leg is different



for small vessels and fat

very thick tissue; as gastric tissue

STAPLE CONFIGURATION



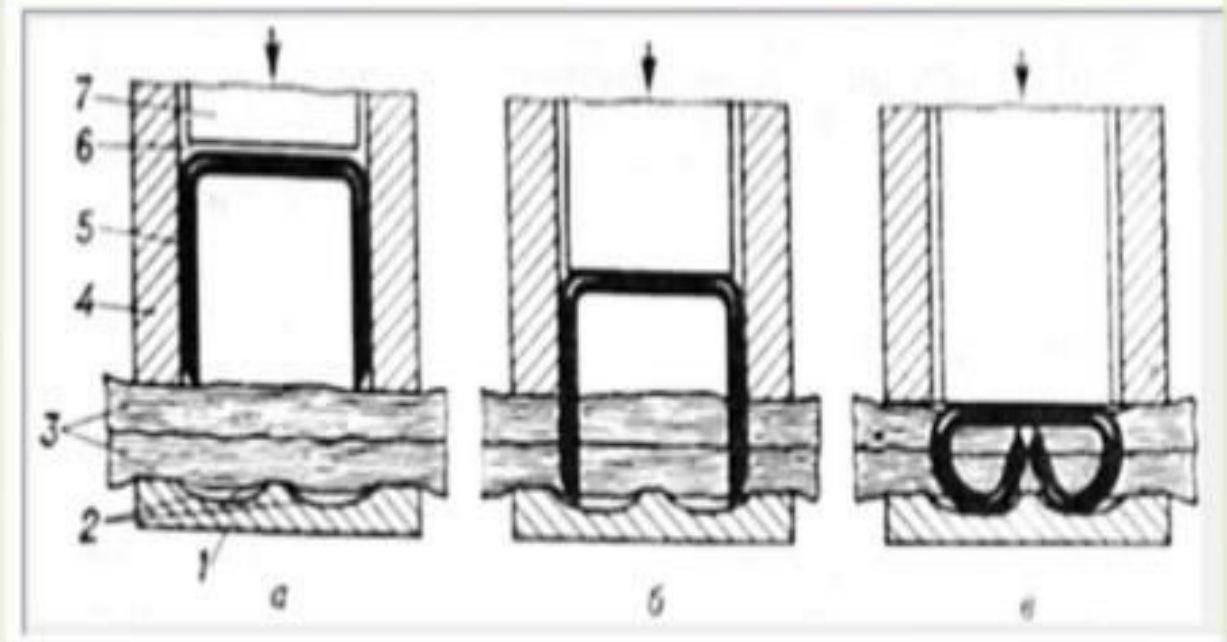


Diagram of stitching being made with metal staples. *Left*, the stitched parts of the soft tissue are compressed between the magazine and matrix; *middle*, the staple is pushed from the magazine by the pusher and pierces the parts of the soft tissue; *right*, the staple stems are inserted inside the craters, get deformed, and stitch the parts of the tissue. *1*, matrix; *2*, craters; *3*, stitched tissue; *4*, magazine; 5, staples; *6*, slot; *7*, pusher. The *arrows* show the direction of movement.

stapling of
base of appendix

Important roles in laparoscopic procedures

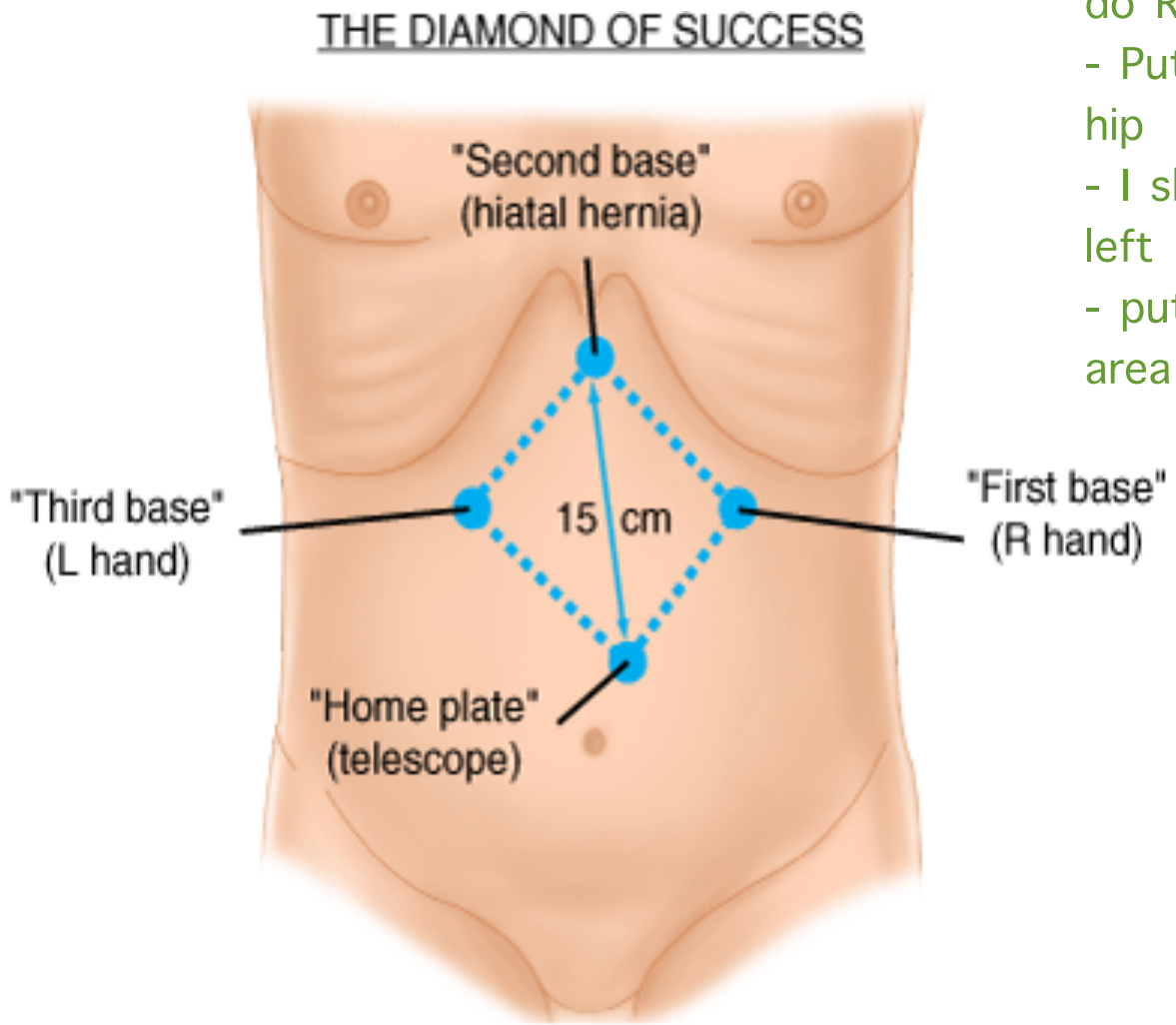
- Patient & surgeon position
- Position of the trocar
- Distant between trocar
- Size of trocar
- Examples, fundoplication, APR, Splenectomy, bowel resection, colostomy, …….

Patient position

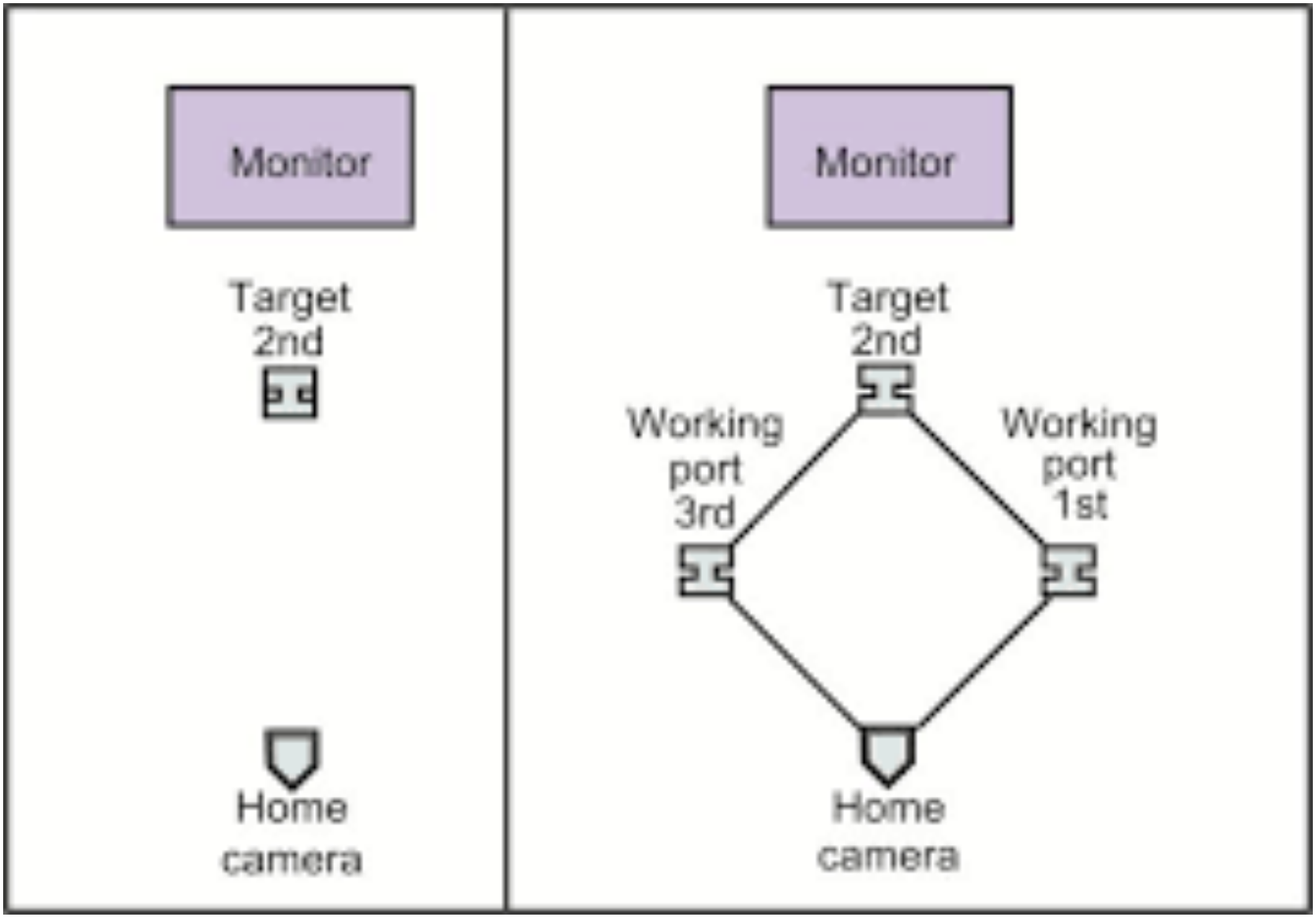
- Supine
- Prone
- Lithotomy separating the legs
- Lateral
- Jak-knife Prone but the leg is down (buttocks are up)
- Modified lithotomy

scope opposite to organ.
screen on the organ

TROCARS POSITION



Example; if i'm going to do Rt inguinal hernias ;
- Put the scope on the LT hip
- I should stand on the left
- put the screen on Rt area of the hip


Monitor
Target
2nd
Home
camera
Monitor
Target
2nd
Working
port
3rd
Working
port
1st
Home
camera

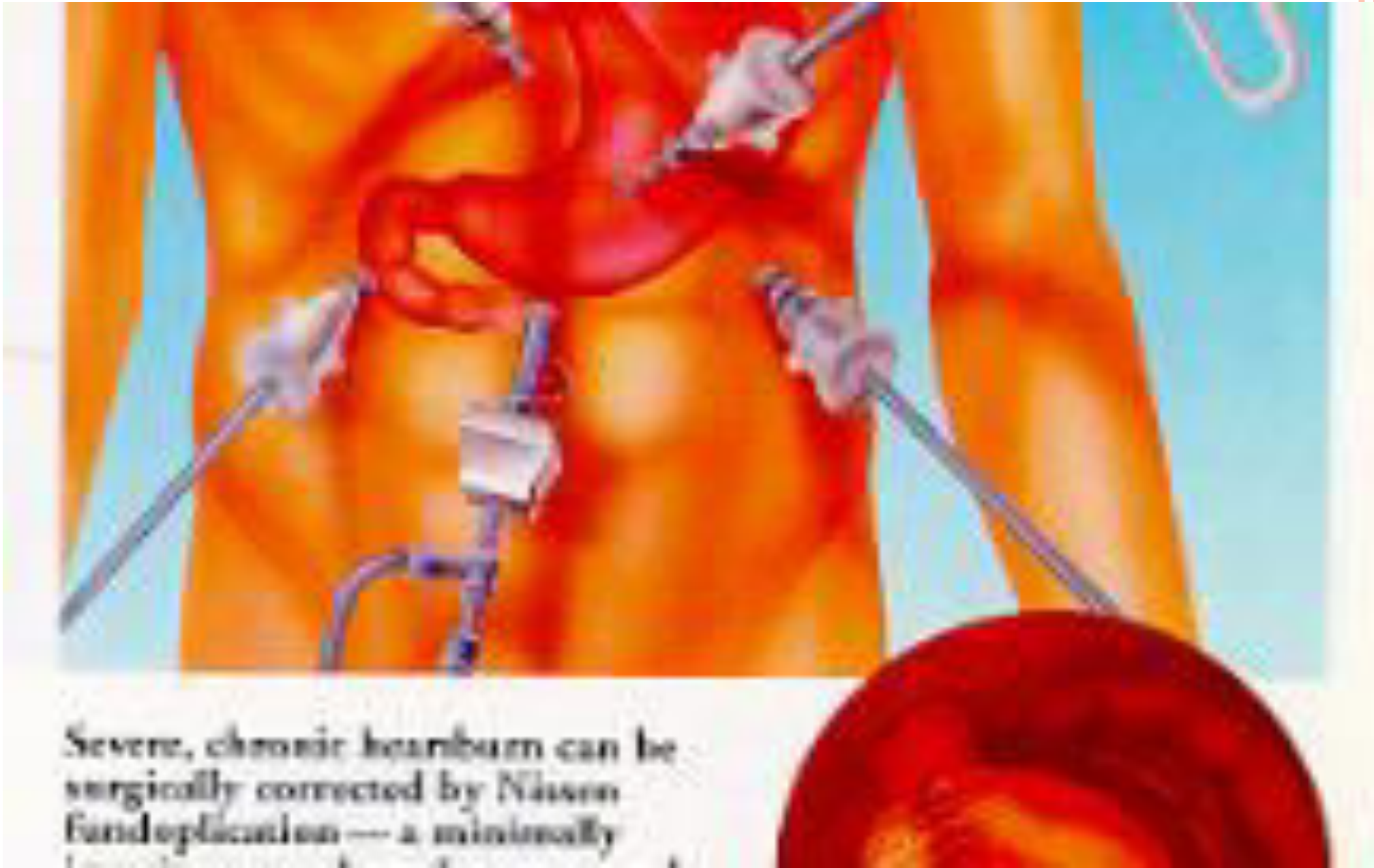
Fundoplication, Hernia, Colon surgery

- Patient and surgeon position
- What is the scope (size, degree)?
- How many trocars?
- What is trocar size?
- Where will be the screen?

FUNDOPLICATION : wrapping stomach around esophagus
esophagus in the upper midline
I have to be between the legs
My screen should be on the Right shoulder of the patient
My scope should be in the umbilicus

Hernia and Colon depend on the position (previous slide)

Fundoplication



How to control Bleeder

- DO your best not to have it
- Prepare your self with : strong suction device, other trocars, clip applicator
- Vessels bleeding : Packing, proximal control, electrocautery, clip application, stapler Gray
- Raw service oozing: packing, electrocautery, Argon Beam coagulator, haemostatic agents

Others

- NOTES

  Mean natural opening Orifices; Mouth, rectum, Vagina then going inside the peritoneum

  So no skin incisions

- Hand- Assisted laparoscopic surgery

  Means : You do all the procedure laparoscopic
  then you need to used your hand either to
  - take the sample by your hand
  - too much adhesion hand will help you