

# ANESTHESIA IN LAPAROSCOPIC SURGERY

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DR. ALAA ALMHANAA

MRCSI



# History of LAPROSCOPY



The Hippocratic impulse underlying the demand for moral action on the part of doctors was one of the many factors responsible for the introduction of minimally invasive surgery as we know it today. Surgeons and physicians have been consistently focused on minimizing the risks and complications of surgery.

The history of laparoscopy reveals that a large number of steps and individuals were involved in the establishment of complex surgical techniques as we know them today

Hippocrates II (born in 460 B.C., died in 375 B.C.), the principal representative of the school of Kos, described the use of a speculum for investigation of the rectum . Similar instruments for examination of the vagina were found in the ruins of Pompeii (destroyed in 70 A.D.) and have been described in other cultures as well. However, the scope of investigation was limited by the need to illuminate the field of investigation. Illumination has been a persistent issue in the history of laparoscopy

Albukasim (912-1013 A.D), an Arabian physician, was the first to use reflected light to view the inside of the body. He held a glass mirror in front of the vulva and thus reflected light into the vaginal vault .





المؤلة على شبر مولا رجلا ما منعي حجة ما يتش بها قنما ثم الخجل ما يتش الزاير من مضمو  
في الوجه وانما سله كقوى لا لا استعمل من مخزوماء ثم ارفع يركب لا لا كمل وقعمل  
بالكلايب سوا على قزر ما يترين فتح مع الزيم حتى تصنع الغالبة ما في عنان شال الله  
**صورة لولب اخر له كركه الملا وايل**



**صورة المشراخ التي يُشْرَخُ به راس الجحش**

gettyimages®

Credit: Heritage Images

شبه المفعول له اسنان في الكوي كراتي وفرد تصنع مستقيمة كالكلاليب على  
منه الصورة كما ترى بها اسنان كما اسنان المشراخ بقكح يهد ويرص

منه ٢٧ كما كثر انوا حها وكان قد رغب الصانع كما في شرح العله وازرع  
عشر اثنا عشر لعدو فلا يستعمل منها المدة ان تكون عترة لانه لا يدر الحاجة العمل  
ان تقع في اصوله وقلان فاعلمه **الفصل السابع والسبعون**  
في اجزاء المشتملة على الخمسة عشر النظم منتهى تمام العلم

اقتناء فيلدا على ما علمه جان فان  
العلم حتى يتصل بالجملة الاخرى فان كان العبد في اتمال مقطين فليتن فيه حيلة غير  
الجزء فان كان في اتمال مقطين العبد في مشكك اليه او مشكك الرجل في عياله  
غير جزاء ولا كثر ينبغي ان نعيش القيد كيف ما حكم له ونجته وتغيبه على له خيال  
يخيل له في حيلة تشفيهم له متى لمع يعترضه جزوق وعصب واعلم ان المفايح والمناش  
لوضع مشيئة العمل كشيء على حبس وضع العمل وبضيه وعملها ورقها وكبير ما  
وصغر ما وصلاتهما وتخلخلها قل له ينبغي ان يغير لكل نوع من العمل آلة مشاكلة لذلك  
العمل واعلم ان لا عمل انعتهم فرت له على نوع لا لا التي تحتاج انيلا انك انت  
معد رنة كويلة ومعرفة يعشون منه الصلحة لان من الصناعات ضرورية لا تراض  
فقد تستهلك لنفسه ما يشاكله في لا لا لكل منقروا انا مصور له في مشايب  
عدة لا لا تجعلها امثلة لحثري عليها وفيل شة تعين عمل على غير ما في شال الله

**صورة مشرك كبير**





في الأندلس، كان العلماء يجمعون بين  
العلم والدين والفن، فمثلاً الطبيب  
الزهراوي من قرطبة هو أول من اخترع  
أدوات للجراحة ما زال يُستخدم بعضها  
حتى اليوم

TikTok  
@...alsham







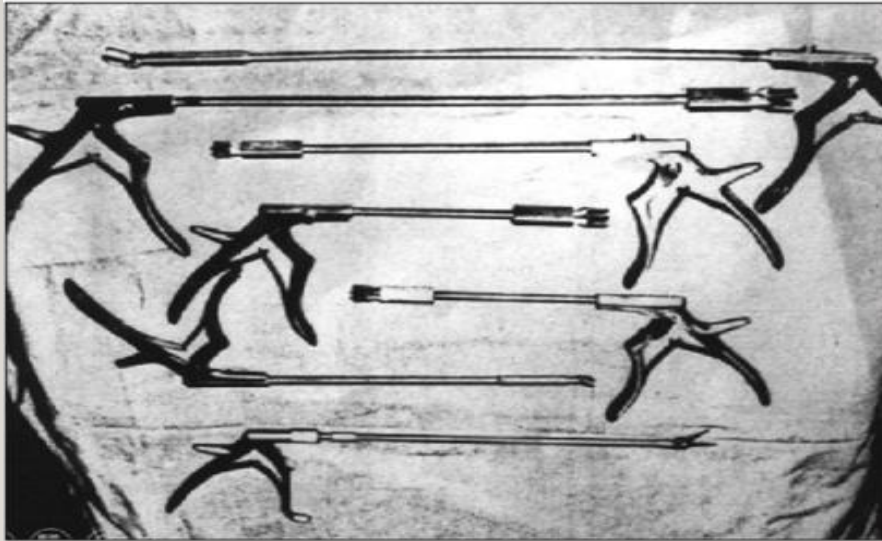
Pioneers of laparoscopy. **(A)** Philipp Bozzini (1773–1809), **(B)** Antonin Jean Desormeaux (1815–1894), **(C)** Georg Kelling (1866–1945), **(D)** Maximilian Nitze (1848–1906), **(E)** Heinrich Kalk (1895–1973), **(F)** Raoul Palmer (1904–1985)



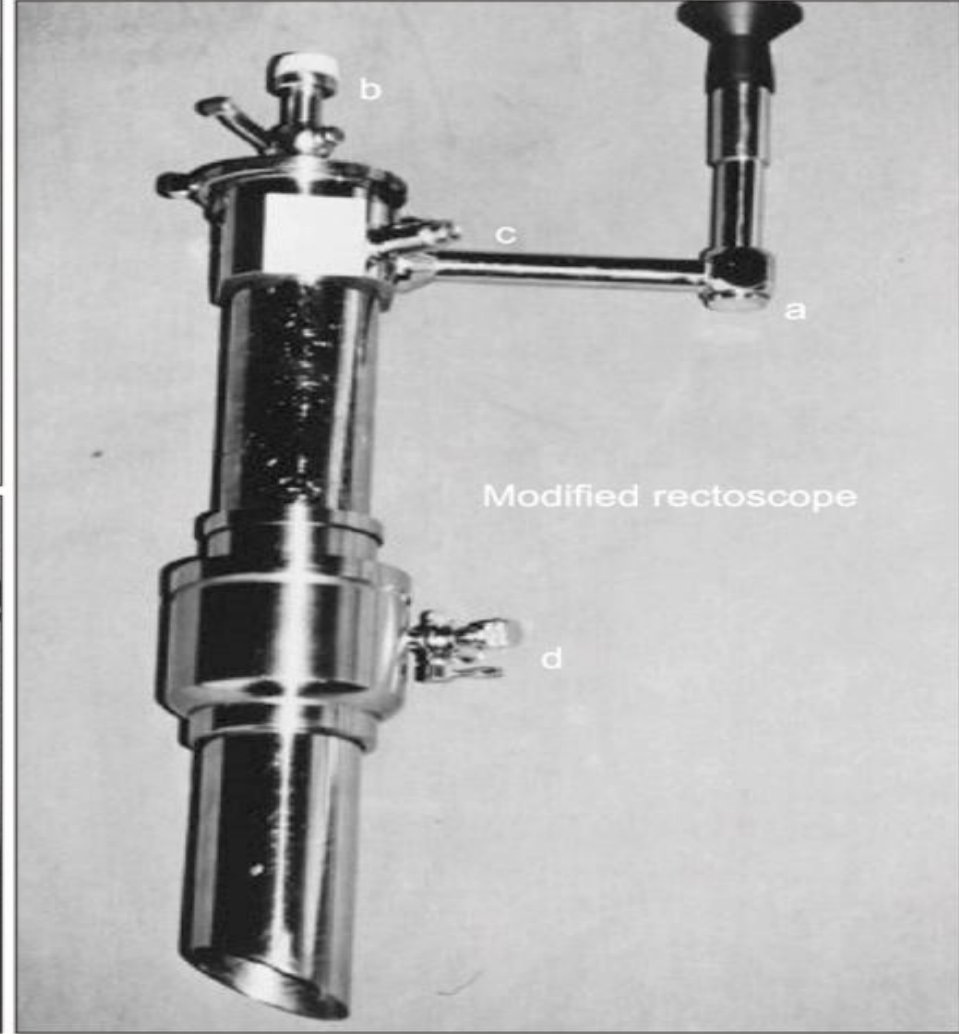
Pioneers of operative laparoscopy. **(A)** Hans Frangenheim (1920–2001), **(B)** Kurt Semm (1927–2003), **(C)** Karl Storz (1911–1996).



The first laparoscopic cholecystectomy was performed by German surgeon Erich Mühe on September 12, 1985, but his work was initially met with skepticism.



Galloscope-Laparoscope invented by Erich Mühe



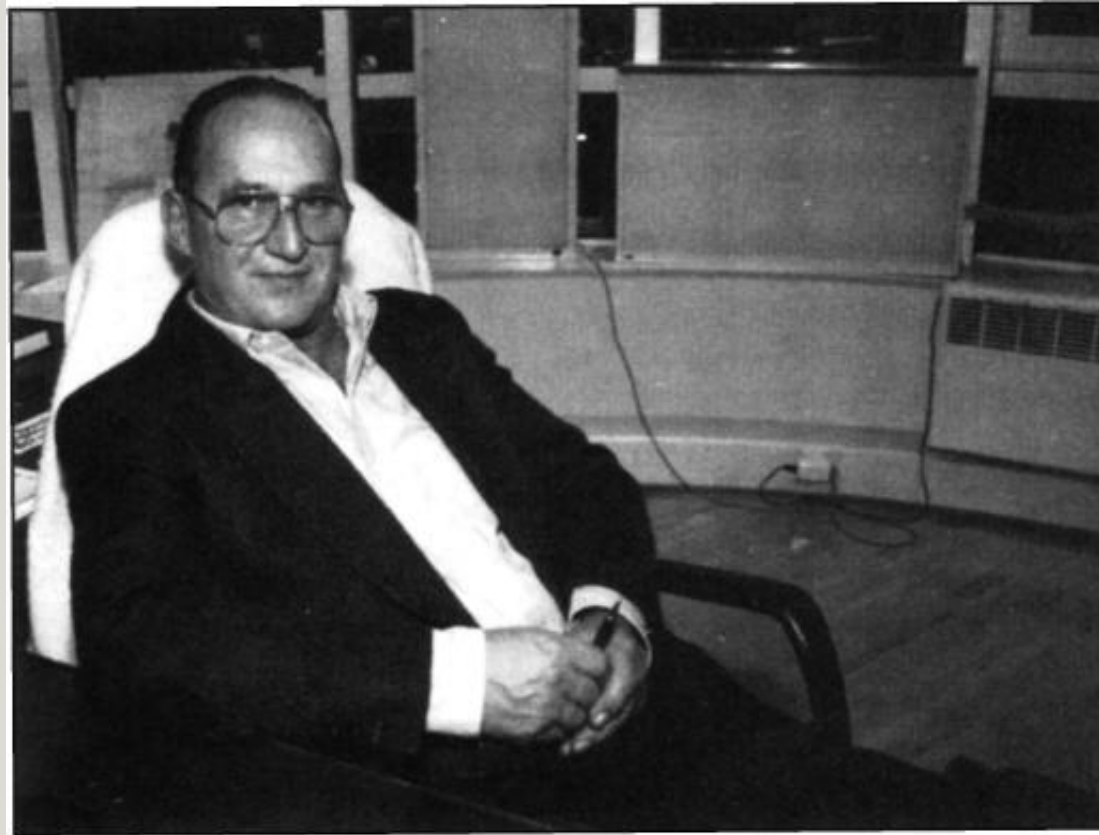
**Prof. Dr. Eric Mühe** (1938 - 2005) Much has been written about who gets the glory of having performed the first laparoscopic cholecystectomy. Many famous names are in the annals of Surgery listed as pioneers in this field: Perissat, Berci, Mouret, Dubois, Sepulveda, Reddick, McKernan, Saye, Lizana, and others. Prof. Dr. Eric Mühe was usually not mentioned, but there is no doubt that on September 12, 1985, Dr. Mühe performed a laparoscopic cholecystectomy using a device of his own design (Galloscope) which lifted the anterior abdominal wall, maintained pneumoperitoneum, and doubled as a laparoscope.

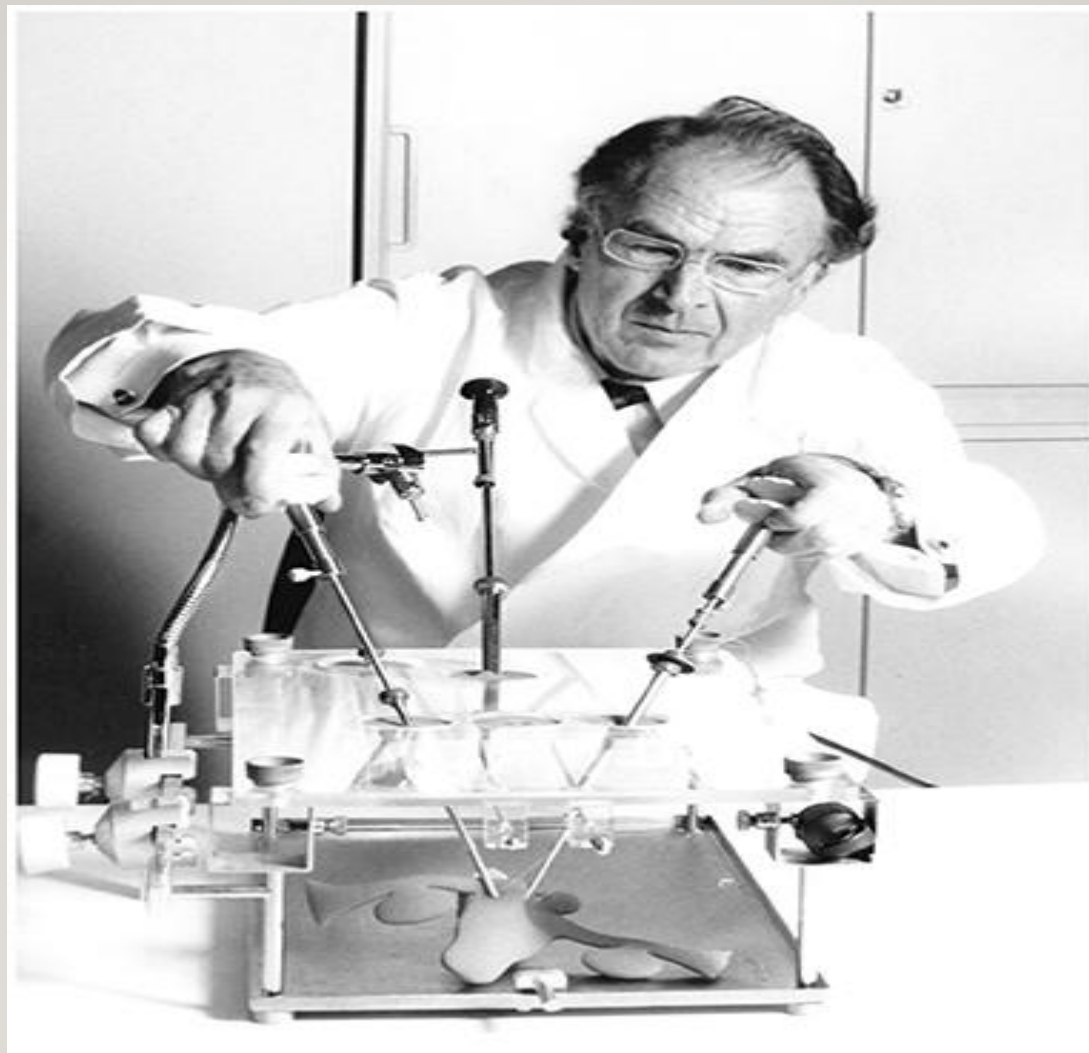
Dr. Mühe was an avid cyclist and built and repaired his own bicycles. he was looking at bicycle metal tube, and when looking through it, he thought that he could obtain access to the abdomen and the gallbladder with minimal changes. he passed in 2005.





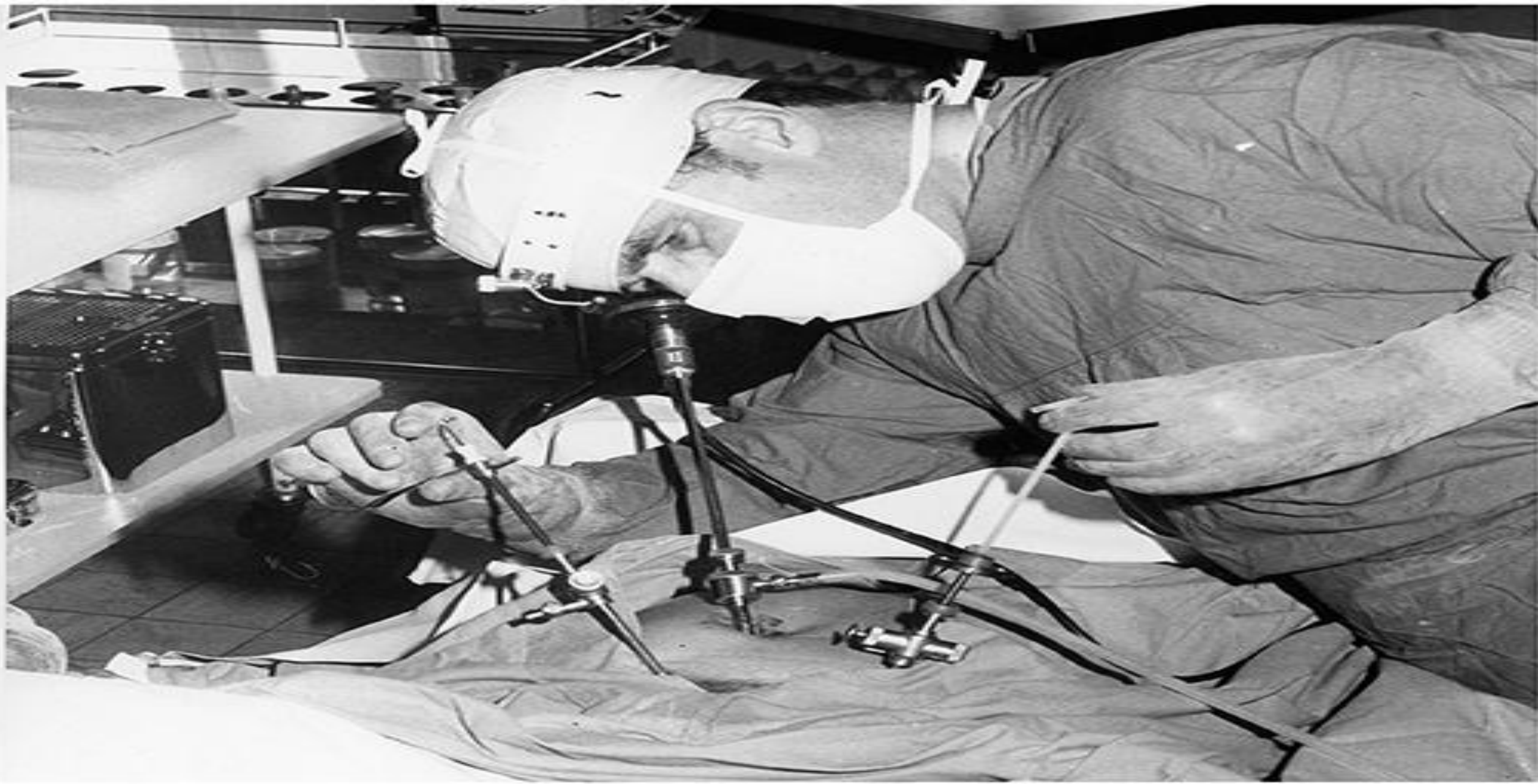
French surgeon Philippe Mouret is often credited with its widespread adoption after performing the procedure in 1987 with a technique that became the new standard. The procedure rapidly gained acceptance,





. Pelvi trainer (1985). Source: Department of Obstetrics and Gynecology, University Clinic of Kiel.











Laparolift



Laparofan attached with Laparolift after introduction inside the abdominal cavity



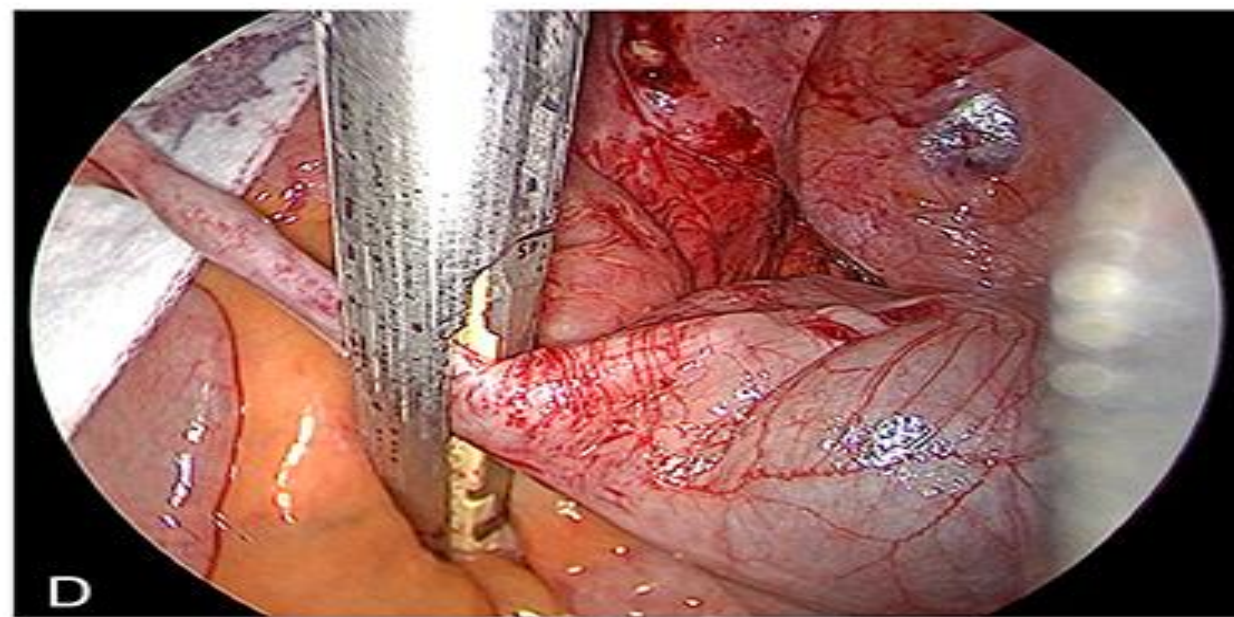
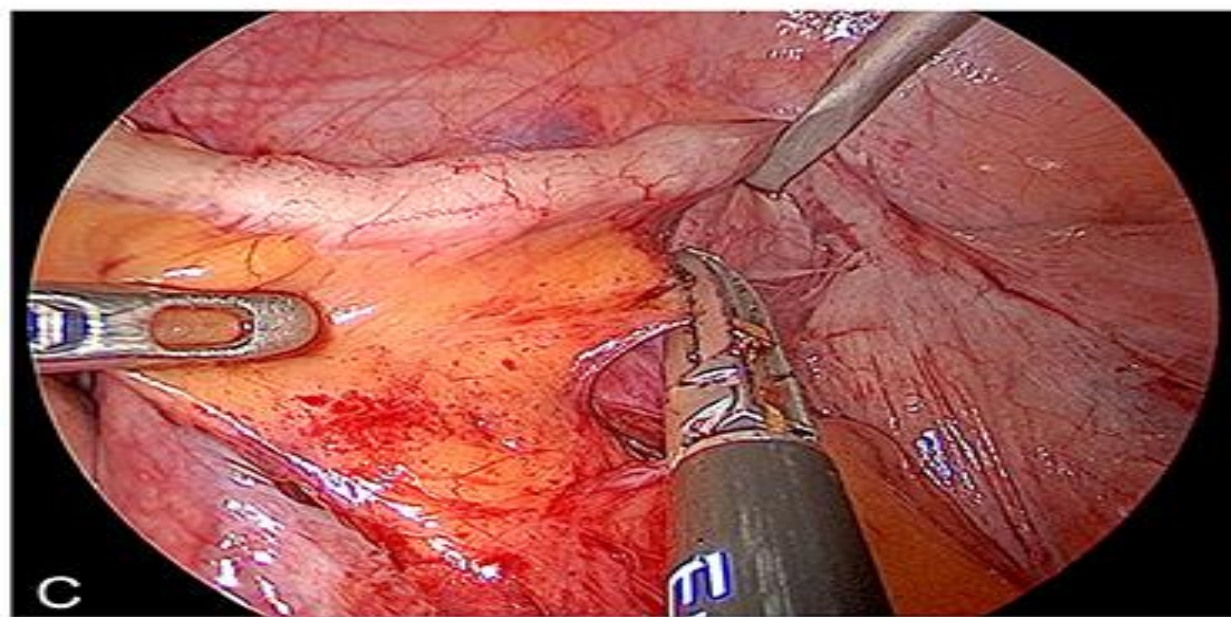
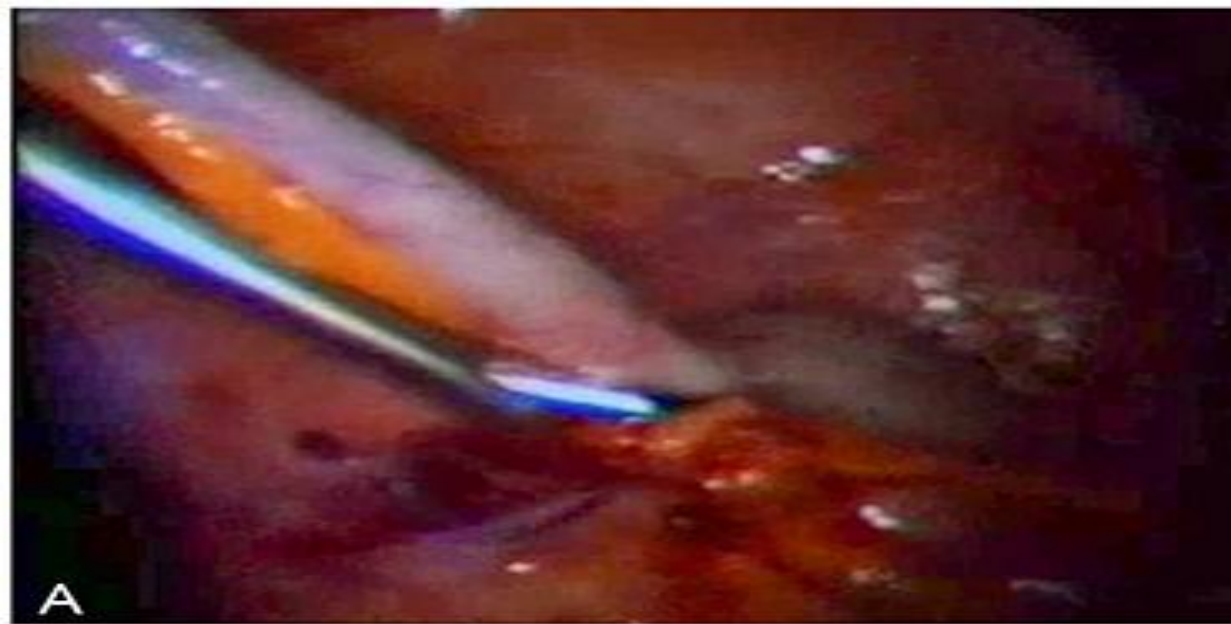


Abdolift (another variety of abdominal lifting device)

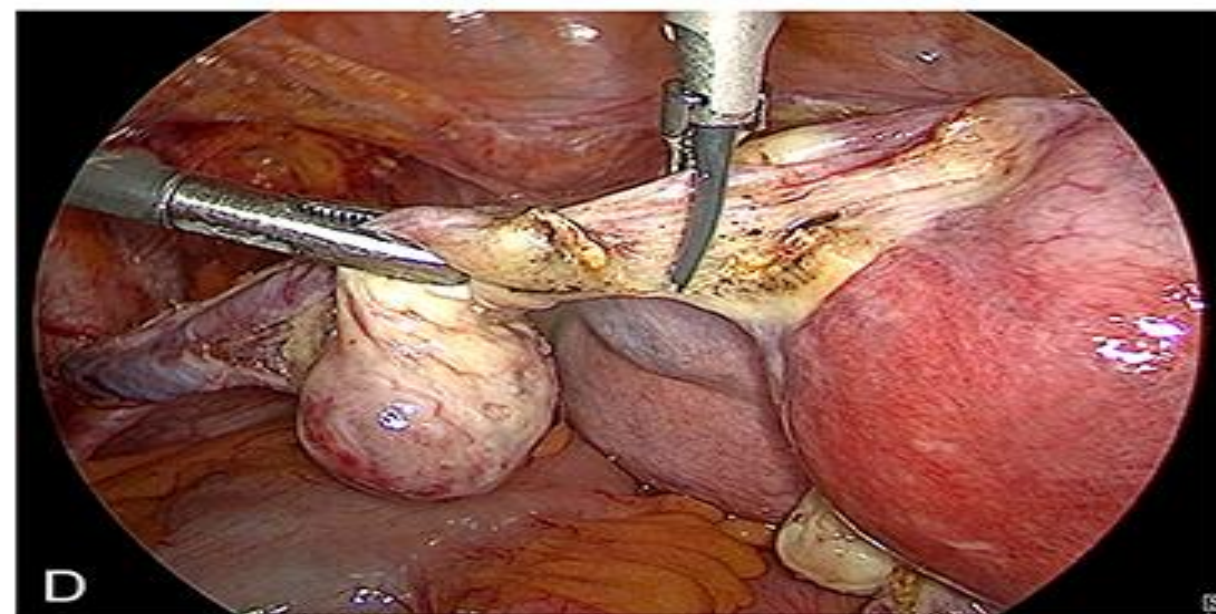
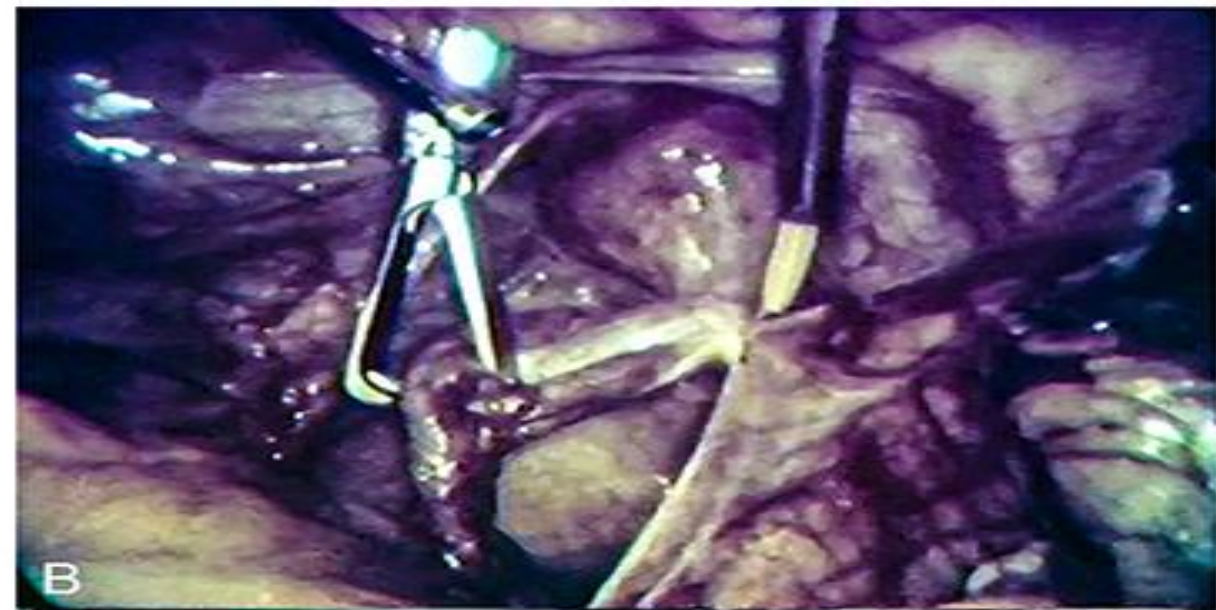
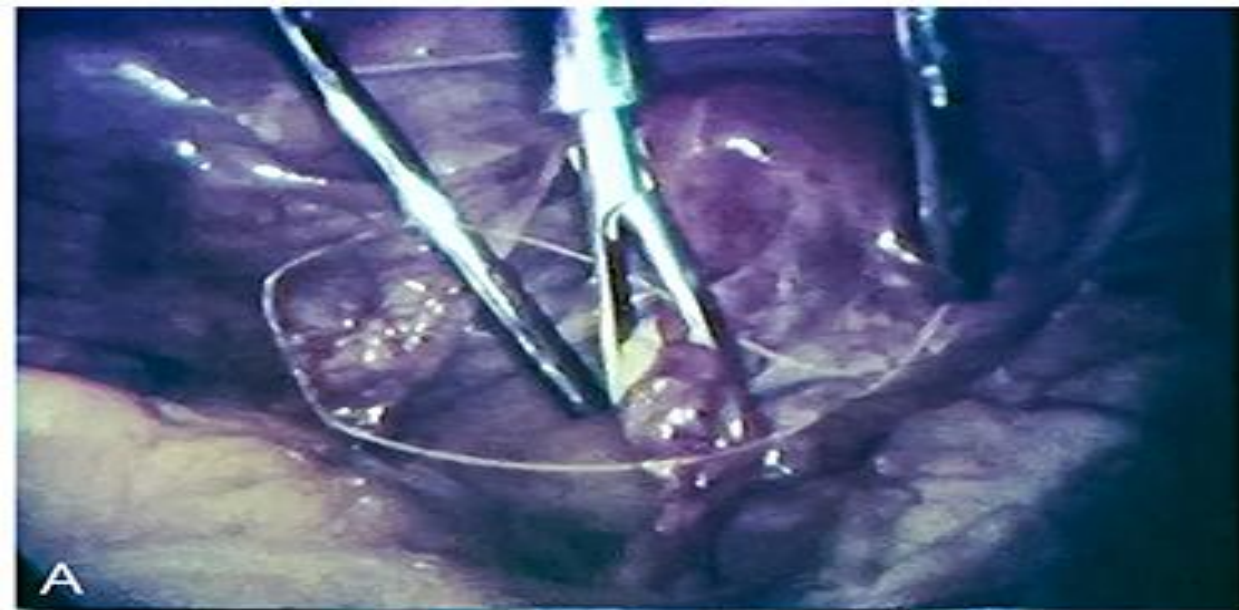


Abdolift lifting the abdominal cavity











. Optimal anesthetic care of patients undergoing laparoscopic surgery is very much important. Good anesthetic techniques facilitate risk-free surgery and allow early detection and reduction of complications. In young patients, fit for diagnostic laparoscopy, general anesthesia is the preferred method and does not impose any increased risk. Adequate anesthesia and analgesia are essential and endotracheal intubation and controlled ventilation should be considered. The pneumoperitoneum can be created safely under local anesthesia provided that the patient is adequately sedated throughout the procedure. For successful laparoscopy, under local anesthesia, intravenous medication for sedation should be given.



## An ideal general anesthesia machine should have:

- Spontaneous Breathing with Computerized Ventilation
- Manual Ventilation
- Volume Controlled Ventilation
- Pressure Controlled Ventilation
- Computerized Pressure Support

A variety of muscle relaxants including succinylcholine, mivacurium, atracurium, vecuronium is available for rapid recovery and cardiovascular stability. Total intravenous anesthesia using agents like propofol, midazolam, and ketamine, alfentanil, and vecuronium has been reported for outpatient laparoscopy.







# Problems due to pneumoperitoneum

- Hypothermia
- Cardiac arrhythmia
- Cardiovascular collapse
- Pulmonary insufficiency
- Gas embolism
- Venous thrombosis
- Cerebral edema/ischemia
- Ocular hypertension
- Extraperitoneal insufflation (subcutaneous emphysema, pneumomediastinum)





Pneumoperitoneum at the time of laparoscopic surgery causes upward displacement of the diaphragm, resulting in the reduction in lung volumes including functional residual capacity (FRC). Pulmonary compliance is reduced and airway resistance is increased due to high intraabdominal pressure (IAP). The anesthetist often uses high airway pressure to overcome the IAP for a given tidal volume, which increases the risk of hemodynamic changes and barotraumas.



The following monitoring device should routinely use at the time of minimal access surgical general anesthesia:

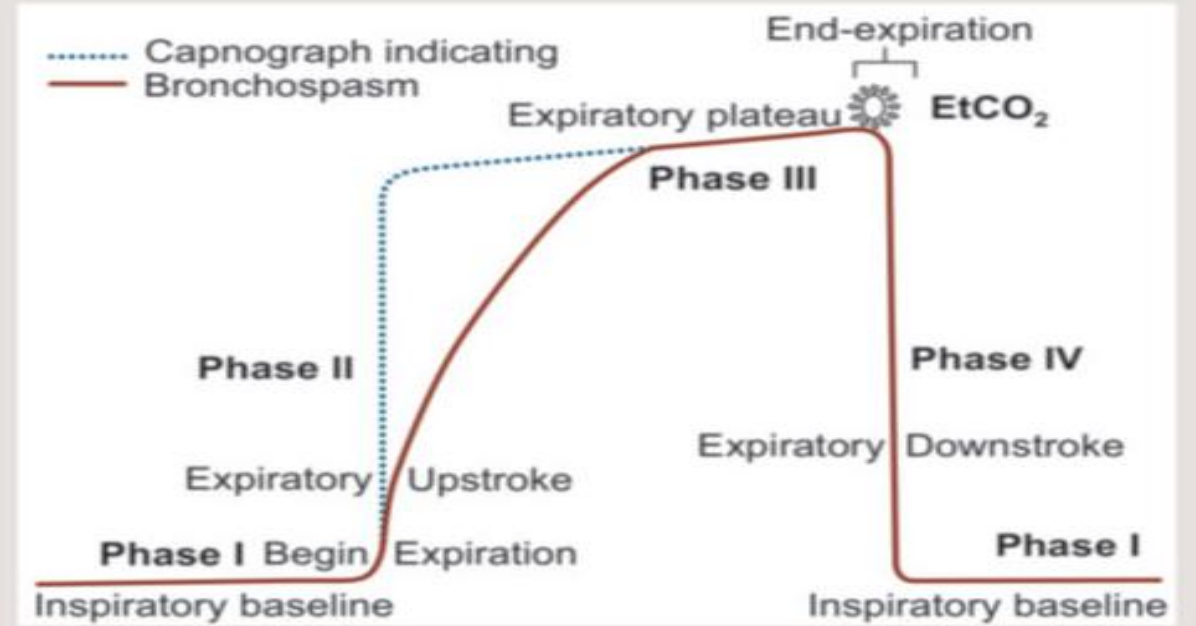
- Electrocardiogram
- Sphygmomanometer
- Airway pressure monitor
- Pulse oximeter
- End-tidal CO<sub>2</sub> concentration (PETCO<sub>2</sub>) monitor
- Peripheral nerve stimulator
- Body temperature probe.







: Portable carbon dioxide (CO<sub>2</sub>) monitor.



Capnograph.  
(EtCO<sub>2</sub>: end-tidal carbon dioxide)



Balanced anesthesia using an appropriate amount of muscle relaxant, intravenous and epidural narcotics, and artificial ventilation is essential to combat the insult and the effects of pneumoperitoneum, namely the resorption of carbon dioxide, diaphragmatic movement impairment and the reduction in lung volumes. Direct arterial pressure monitoring and records of blood pressure and blood gas estimation are needed. The CVP monitoring helps in assessing the preload status. ECG monitoring demonstrates rhythm status continuously



Prophylactic heparin should be used in accordance with the prevention of deep venous thrombosis and subsequent pulmonary embolism.

The use of intermittent inflated pneumatic cast compression helps in maintaining circulation in the legs during the operation.





arrhythmias have been associated with laparoscopy. The most common are junctional rhythms, bigeminy, and asystole. Bradycardia has been reported due to rapid insufflation especially in older patients.

The increasing pressure on the peritoneum increases vagal tone and bradycardia may develop.

This bradycardia may be increased secondary to the absorption of CO<sub>2</sub>. Atropine has proven effective in restoring the vagal tone.



Pulmonary edema can result from aggressive fluid replacement or irrigating fluid absorption

Pulmonary edema is prevented by monitoring fluid input and output. Intraoperative diuretics should be administered if a large discrepancy between fluid input and output is found. If a patient develops respiratory distress

### **Patient Selection**

Patients with cardiac pathology must be subjected to a thorough preoperative assessment

Patients presenting with decompensated congestive cardiopathy are at the highest risk of laparoscopic surgery





The drop in venous return during peritoneal insufflation is one of the important factors which are responsible for drop-in cardiac output during laparoscopic surgery. This drop-in venous return is more important when the hypovolemia develops due to excessive bleeding

## **Local Anesthesia**

# **GASLESS LAPROSCOPY**

### **Three Basic Types**

- Rubber tube sling abdominal wall lifts.
- Planar intraperitoneal abdominal wall retraction lift devices.
- Subcutaneous abdominal wall lift devices.



# **ADJUNCTS DURING LAPAROSCOPIC SURGERY**

**1. Dexmedetomidine**

**2. Clonidine**

**3. Beta-blockers**

**4. Magnesium Sulfate**

**5. Pregabalin**





# Pregnant Women

Pregnant women undergoing laparoscopic surgery present several challenges to the anesthesiologist. The effect of carboperitoneum and increased IAP on the uteroplacental blood flow and its overall effect on the wellbeing of the fetus are the main concerns. In addition, space constraint, trocar insertion, and surgical manipulation.



# LOCAL ANESTHESIA

Many surgeons have done sufficient number of laparoscopic procedures under local anesthesia with IV sedation and results are encouraging with minimal morbidity and negligible mortality. Laparoscopy under local anesthesia should be performed with an anesthetist being present to monitor the patient's cardiac and respiratory functions. IV sedation should be administered with IV diazepam and pethidine. Preferred local anesthetic agent is 1% lignocaine





# REGIONAL ANESTHESIA

Spinal anesthesia is reported enthusiastically for diagnostic laparoscopy without significant complications. Regional anesthesia may be useful for pelvic procedures but if high block is used it interferes with the respiratory status of patient. Bilateral lower intercostal nerve block has also been used, but it is timeconsuming and it can cause pneumothorax.



## **Thoracoscopy**

Thoracoscopic surgery is now traditionally done under general anesthesia and one lung ventilation.

## **Laparoscopic Bariatric Surgery**

## **Pediatric**

Children are generally more prone to intraoperative hypothermia than adults if the insufflation gas is cold. Temperature monitoring must be done





To minimize the negative physiological effects of pneumoperitoneum, it is recommended to have a slower rate of gas insufflation (1 L/min) and a lower IAP (6–8 cmH<sub>2</sub>O in infants and up to 12 cmH<sub>2</sub>O in older children). Induction of anesthesia can be performed safely using either IV or inhalational techniques. Children are generally more prone to intraoperative hypothermia than adults. In laparoscopic surgeries, the core temperature can drop further if the insufflation gas is cold. Temperature monitoring must be done routinely and patient warming measures such as fluid warming system and cutaneous warming measures should be used to prevent hypothermia.



# **ANESTHETIST'S ROLE IN LAPAROSCOPY**

The role of anesthetist in laparoscopic surgery is vital. The laparoscopic surgery should never be performed if anesthetist has no experience in minimal access surgical anesthesia. It is up to anesthetist to identify whether he is capable of performing realistically without compromising the safety of the patients. It is only on these clearly established bases that safe laparoscopy can be contemplated.





## PATIENT SELECTION

- Patients with cardiac pathology must be subjected to a thorough preoperative assessment taking the particular hemodynamic conditions imposed by laparoscopic surgery into account.
- Patients presenting with decompensated congestive cardiomyopathy are at highest risk of laparoscopic surgery because the hemodynamic repercussions would be too difficult to manage, even with the help of invasive monitoring techniques.
- The increase in systemic vascular resistance and the O<sub>2</sub> requirements of the myocardium could be the risk factor in cardiac patients.



# MONITORING

- Electrocardiogram (ECG)
- Rate of respiration
- Pulse oximetry
- Noninvasive blood pressure Monitoring (NIBP).
- Temperature Monitoring.
- End tidal carbon dioxide
- Intraperitoneal pressure Measurements



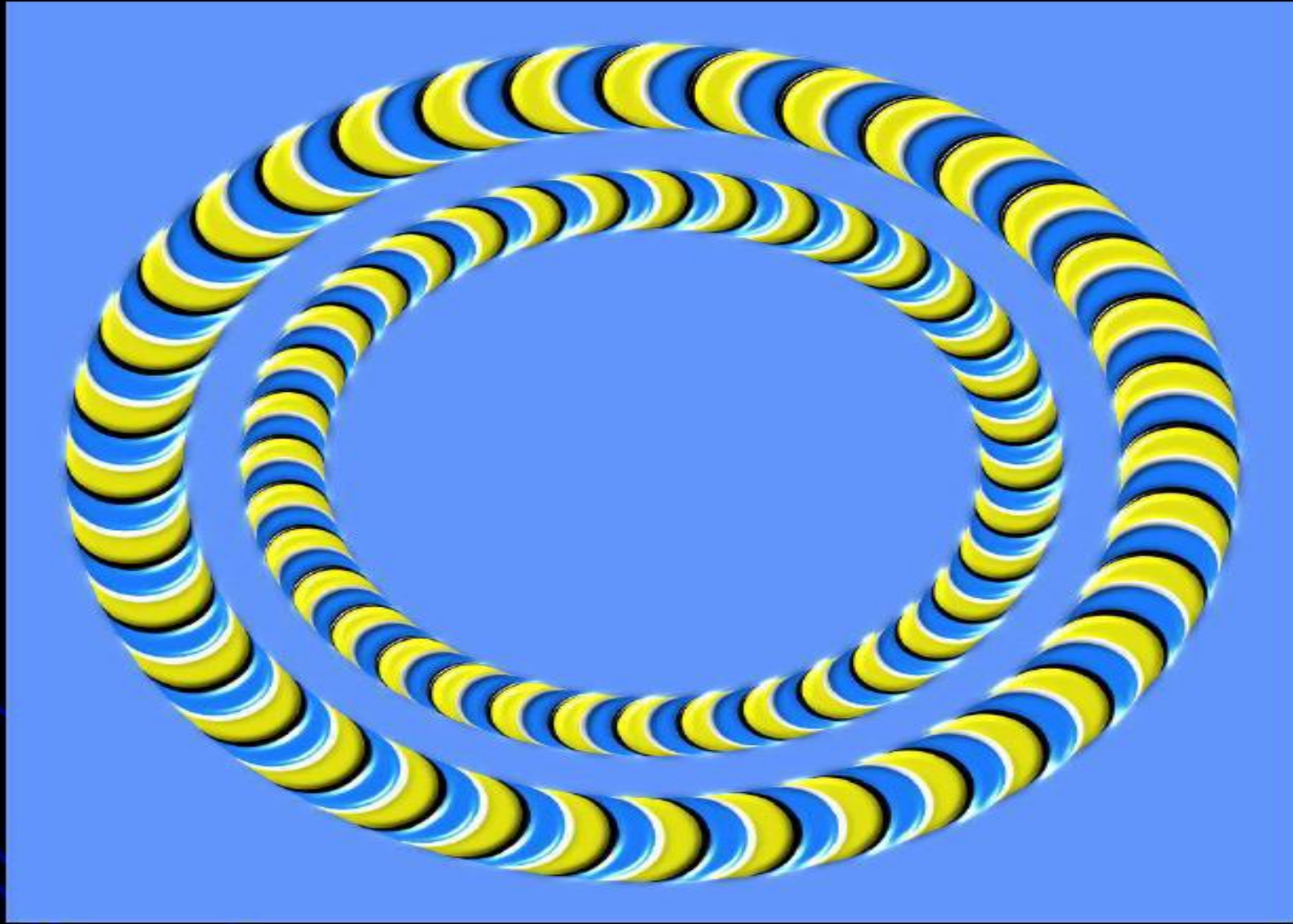


# HRA applicable to all higher risk industries

- Aviation industries
- Nuclear Industries
- Satellites
- Cloning
- MAS

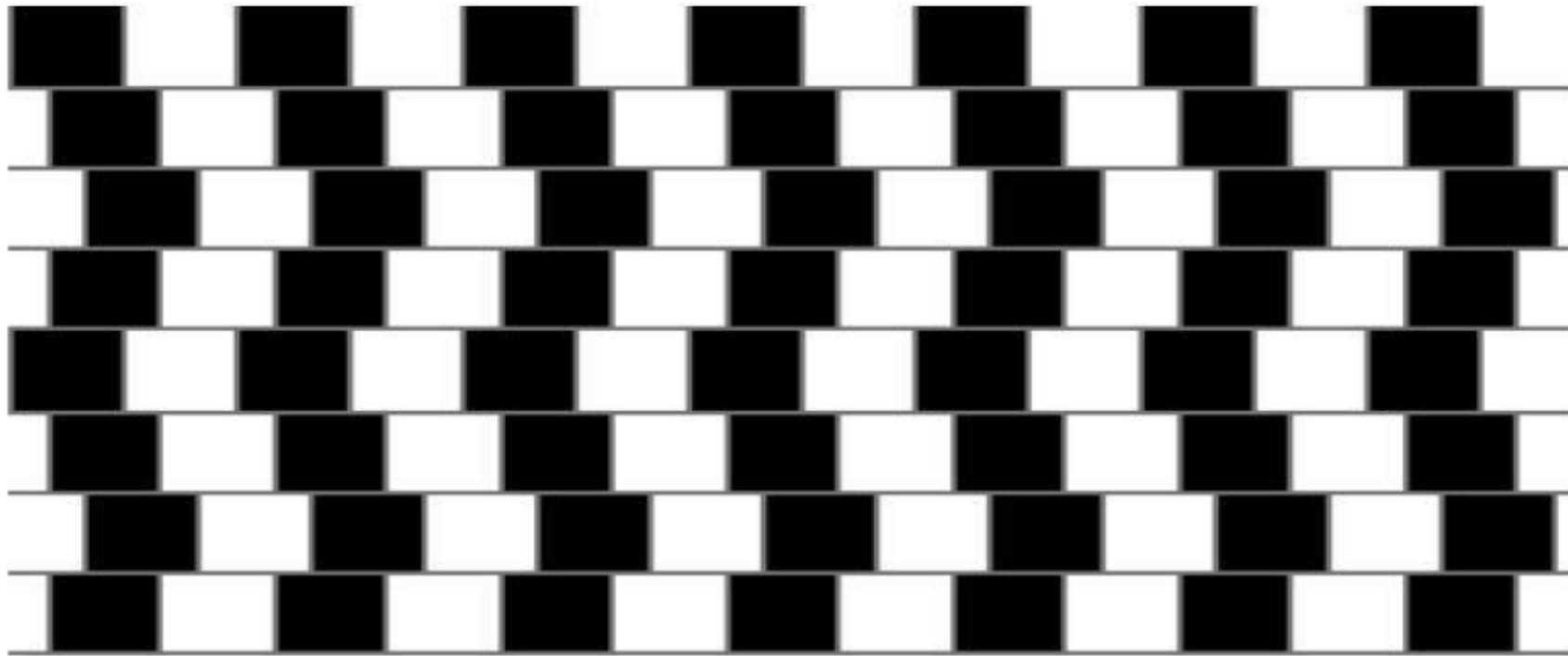


# Optical Illusions





# Optical Illusions



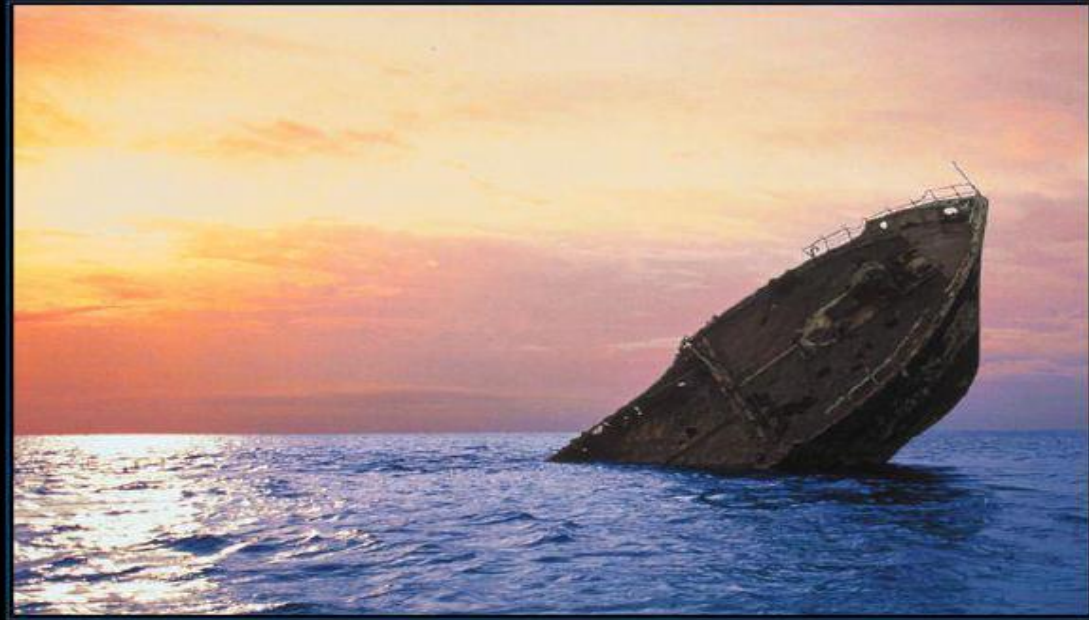
Are the horizontal lines parallel or do they slope?

Thank You

# Human Errors:

*"ALARP"*

Those who were  
Sleeping Can  
Open Their  
Eyes Now !



## MISTAKES

IT COULD BE THAT THE PURPOSE OF YOUR LIFE IS  
ONLY TO SERVE AS A WARNING TO OTHERS.

One can not expect to perform surgery without encountering some type of adverse occurrence.