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Introduction to Endosurgery

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Operations performed:

The abdominal cavity

- Diagnostic laparoscopy
- Appendectomy
- Cholecystectomy
- Hernia gate plastic surgery
- Intestinal resection
- Splenectomy, etc.

Thoracic cavity

- Lung resection
- Sympathectomy
- Mediastinoscopy
- Interventions on the thymus, etc.

Gynecology

- Ovariectomy
- Adnexectomy
- Extirpation of the uterus
- Myomectomy, etc.

Urology

- Nephrectomy
- Adrenalectomy
- Interventions on the prostate, etc.

Endovideosurgery

An area of surgery that allows operations or diagnostic procedures to be performed through pinpoint punctures of tissues or through natural physiological openings

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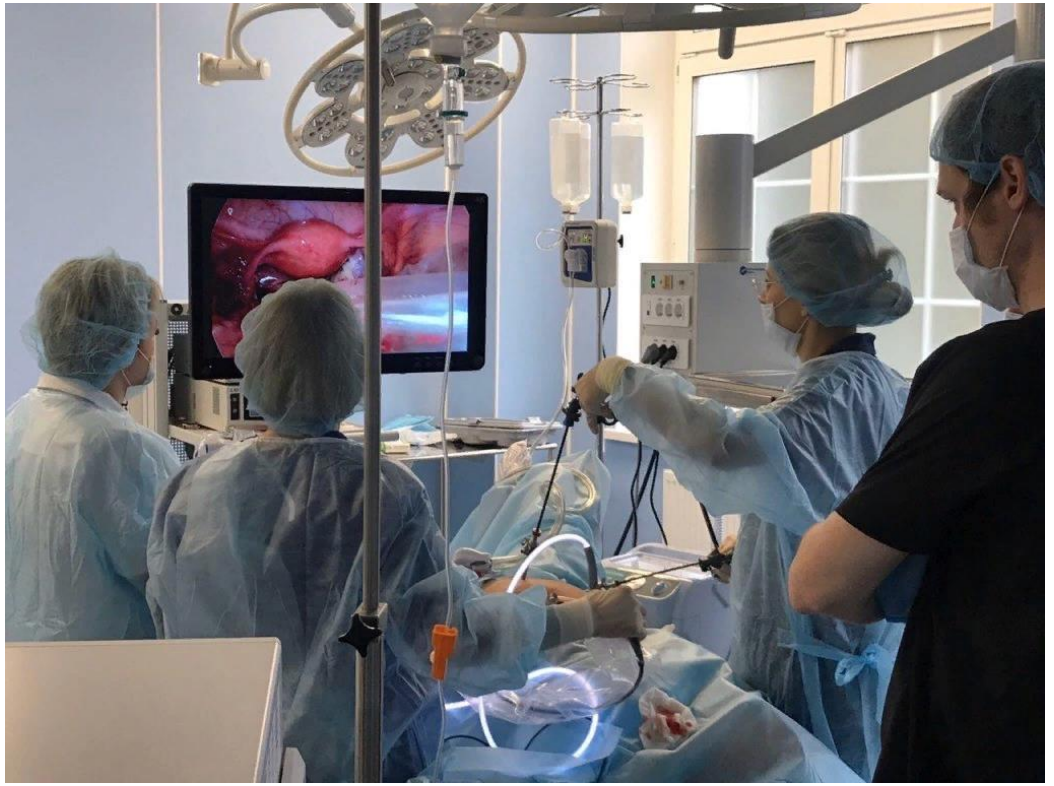
Minimal access surgery (MAS)

- Minimally invasive surgery
- Keyhole surgery
- Buttonhole surgery
- Endoscopic surgery
- Laparoscopy
- Thoracoscopy
- Cystoscopy
- Hysteroscopy, etc.



Advantages MAS:

1. The small size of postoperative wounds reduces pain in the postoperative period, accelerates healing, thereby reducing the time spent in the hospital (by 3 times)
2. «Cosmetology»
3. Enlarged image
4. Reducing the frequency of infection
5. Low frequency of adhesions after intervention
6. The level of pneumonia in the postoperative period is lower
7. Reducing the risk of thromboembolism
8. Reducing the level of immunosuppression

Disadvantages MAS:

1. Expensive equipment
2. The need for special skills (2D)!
3. Long duration of the operation
4. The lack of the possibility of palpation of organs
5. Limitations of the method application

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The effect of pneumoperitoneum on hemodynamics

The pneumoperitoneum produces increased intra-arterial pressure, CO2 absorption, temperature variation, and neurohormonal stress response. The increased intra-abdominal pressure influences all the major systems of the body, leading to significant hemodynamic and ventilatory changes. Increased intra-abdominal pressure interferes with infradiaphragmatic venous and arterial blood flow. It may also displace the diaphragm into the chest cavity, decreasing total lung capacity and functional residual capacity, adding to the acid–base disturbance. Cardiac output is decreased with increase in the ventricular stroke work and the heart rate. Pressure on the abdominal aorta also increases the pressure in the upper body. The ventilatory and circulatory changes can be appreciated within 5 min of the onset of insufflation of gas. Pressures of more than 15 mmHg are associated with significant pathophysiologic effects, but are reversible over a 2-hour period.

The extent of hemodynamic changes associated with the creation of pneumoperitoneum depends on the intra-abdominal pressure attained, volume of CO2 absorbed, patient's intravascular volume, ventilatory technique, and surgical conditions

Several studies have concluded that low intra-abdominal pressure reduces the incidence of hemodynamic and ventilatory changes, leading to minimal and transient organ disfunction and decreases the chances of physiological changes to transform into complications

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Contraindications are absolute:

- State of shock;
- Extensive adhesions in the abdominal cavity;
- The presence of a ventriculoperitoneal shunt;
- Acute cerebrovascular accident, acute myocardial infarction, chronic diseases in the decompensation stage (chronic obstructive pulmonary disease, bronchial asthma);
- Thoracoabdominal injuries.

Contraindications are relative:

- Acute myocardial infarction in the anamnesis, heart defects, operations on the heart and large vessels in the anamnesis, coagulopathy;
- Portal hypertension;
- Spilled peritonitis;
- Previous surgeries in the anamnesis;
- Late pregnancy (3rd trimester);
- Infectious processes on the anterior abdominal wall;
- Bloating of the intestine due to intestinal obstruction;

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Stand with endoscopic equipment

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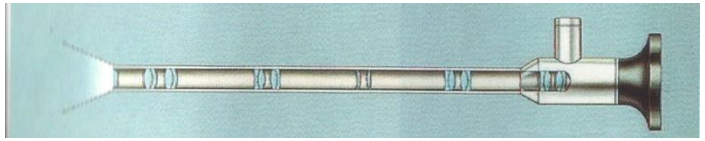
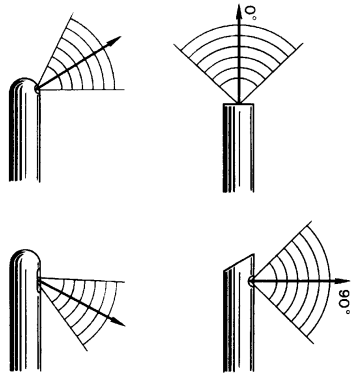
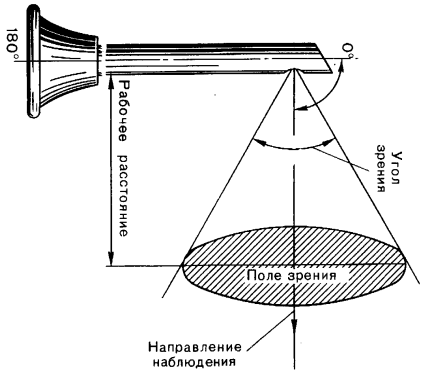
Equipment:



Camera and information processing unit





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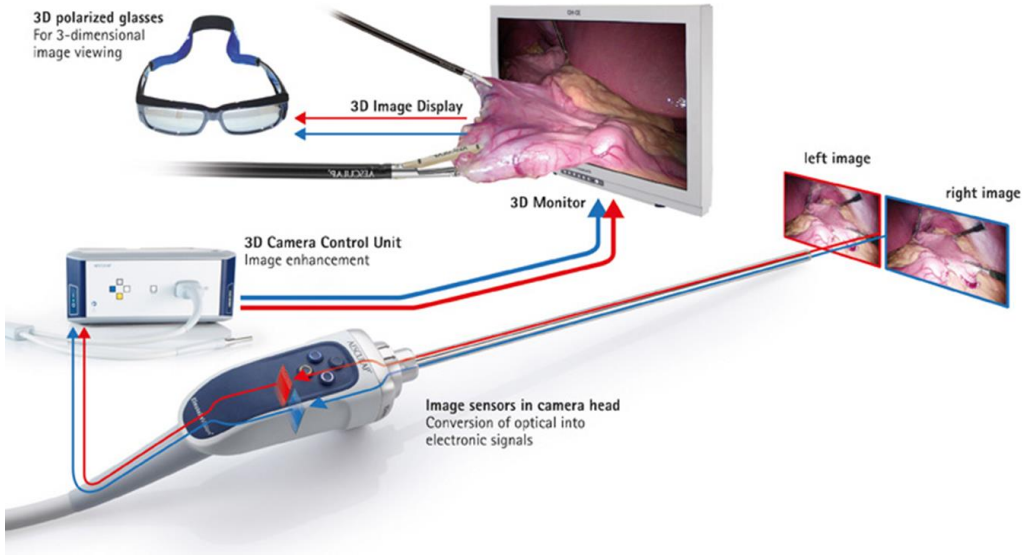

The insufflator

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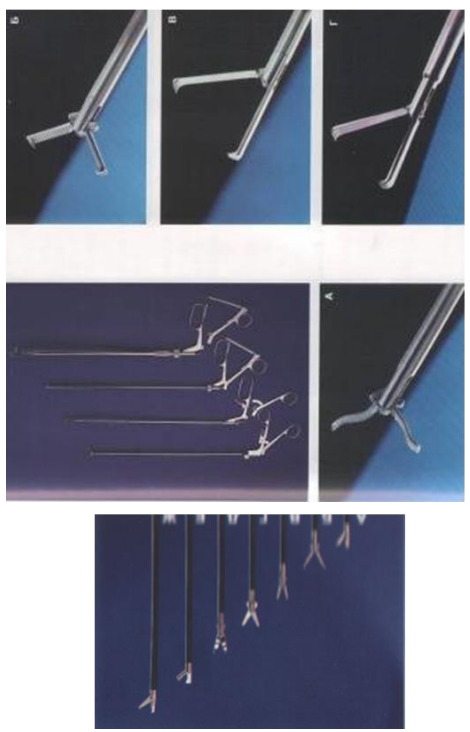
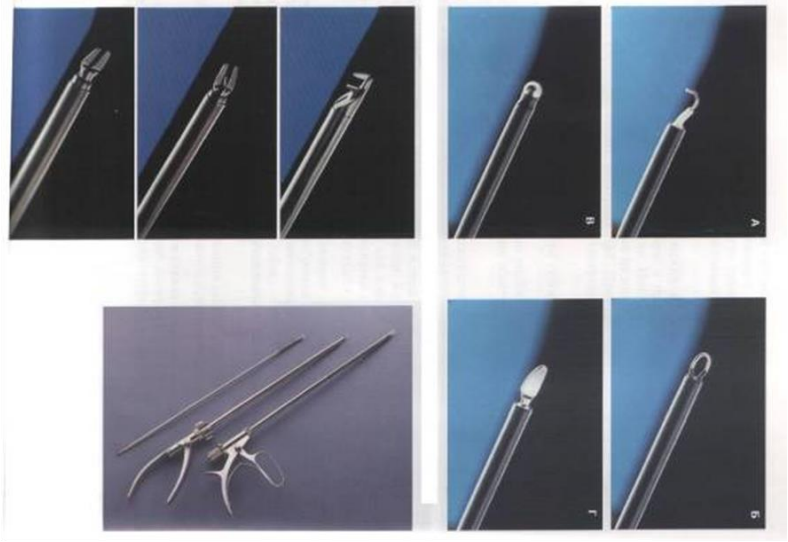
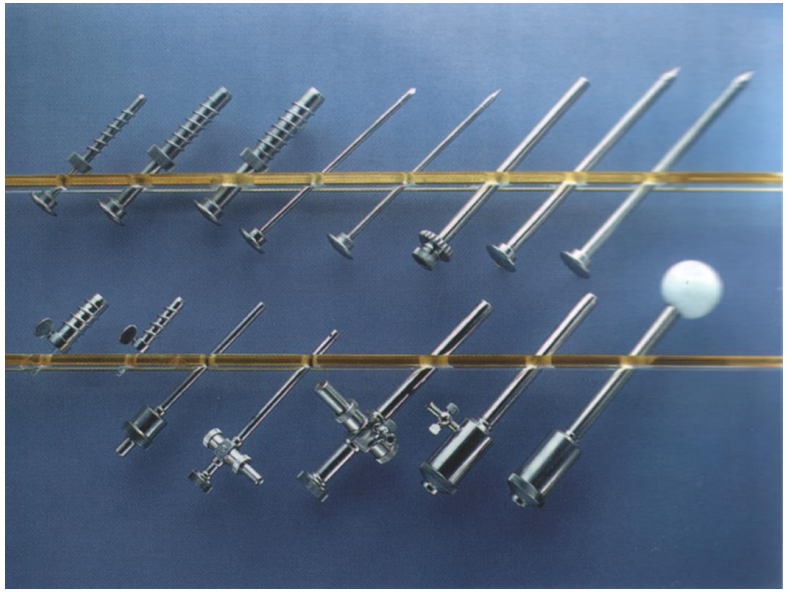
Instruments used in laparoscopic surgery:

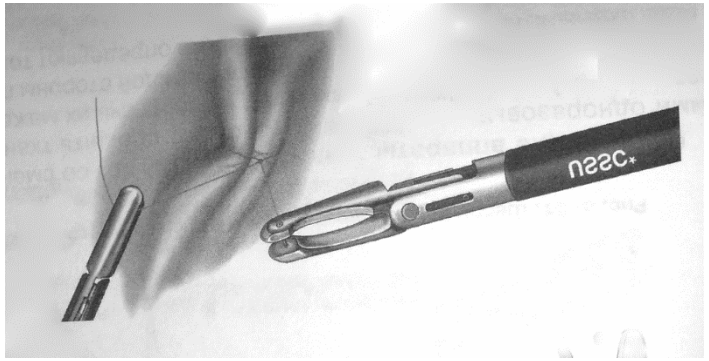
Access Tools







Devices for stitching organs (staplers)



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Electrosurgical instruments

Соединение тканей

1. Endosurgical manual suture
   - Nodal
   - Continuous (including using Endostitch)
2. Endosurgical mechanical suture (stitching devices)

Monopolar electrodes

Bipolar electrodes


LigaSure Advance™

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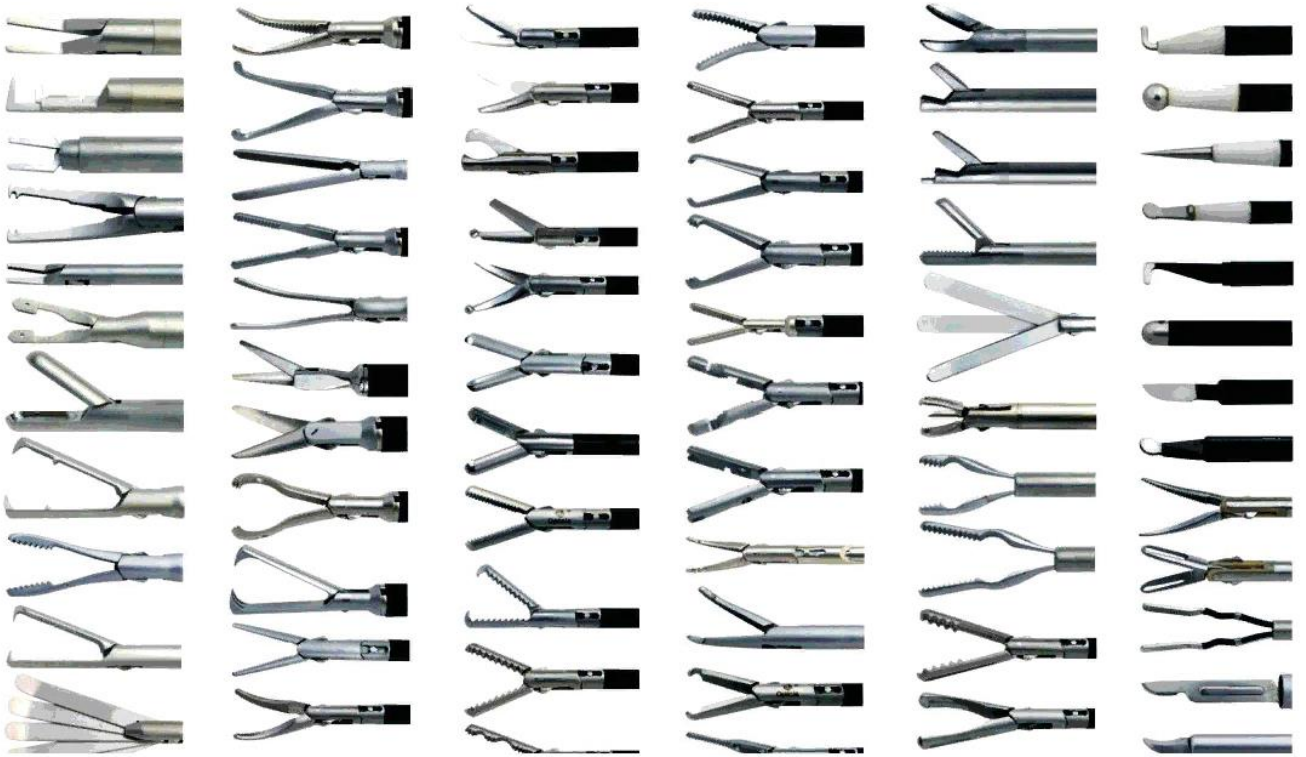
Remote manipulators

Scissors



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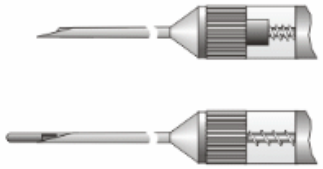
Equipment for supplying gas to the abdominal cavity

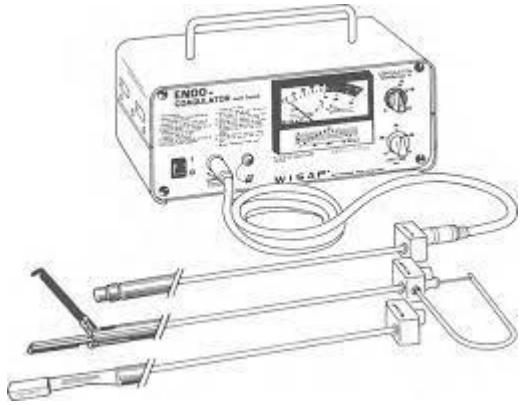
If the central supply of carbon dioxide is not provided in the operating room, carbon dioxide cylinders are used



The Veresh needle is used to create a pneumoperitoneum after puncture of the anterior abdominal cavity in order to create an air cushion and safely insert the first trocar into the abdominal cavity

Liquid supply and evacuation system

Aquapurator(aspirator irrigator)



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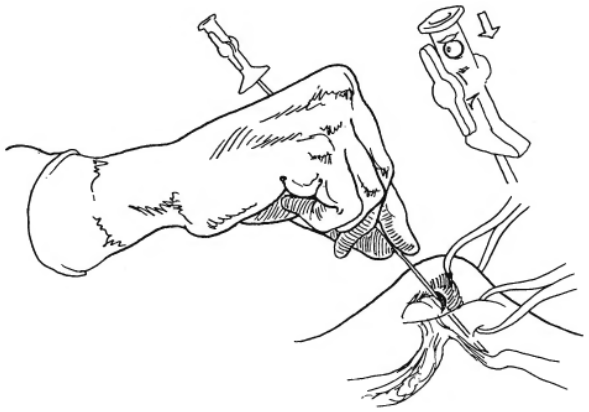
Laparoscopic surgery

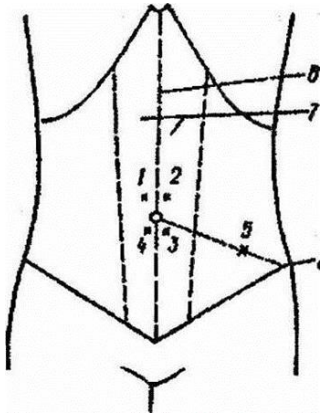
Entrance to the abdominal cavity

1. Closed equipment
2. Open technique
3. SILS (Single Incision Laparoscopic Surgery)
4. HALS (Hand Assisted Laparoscopic Surgery)
5. NOTES (Natural Orifices Transluminal Surgery)



Introduction of the Veresh needle

Points for the introduction of the laparoscope



1. Place of introduction: one of the
2. Tracing Paper points
3. A small incision of the skin, subcutaneous tissue at the site of needle insertion
4. Lifting the abdominal wall with the help of caps
5. Needle IntroductionAspiration test

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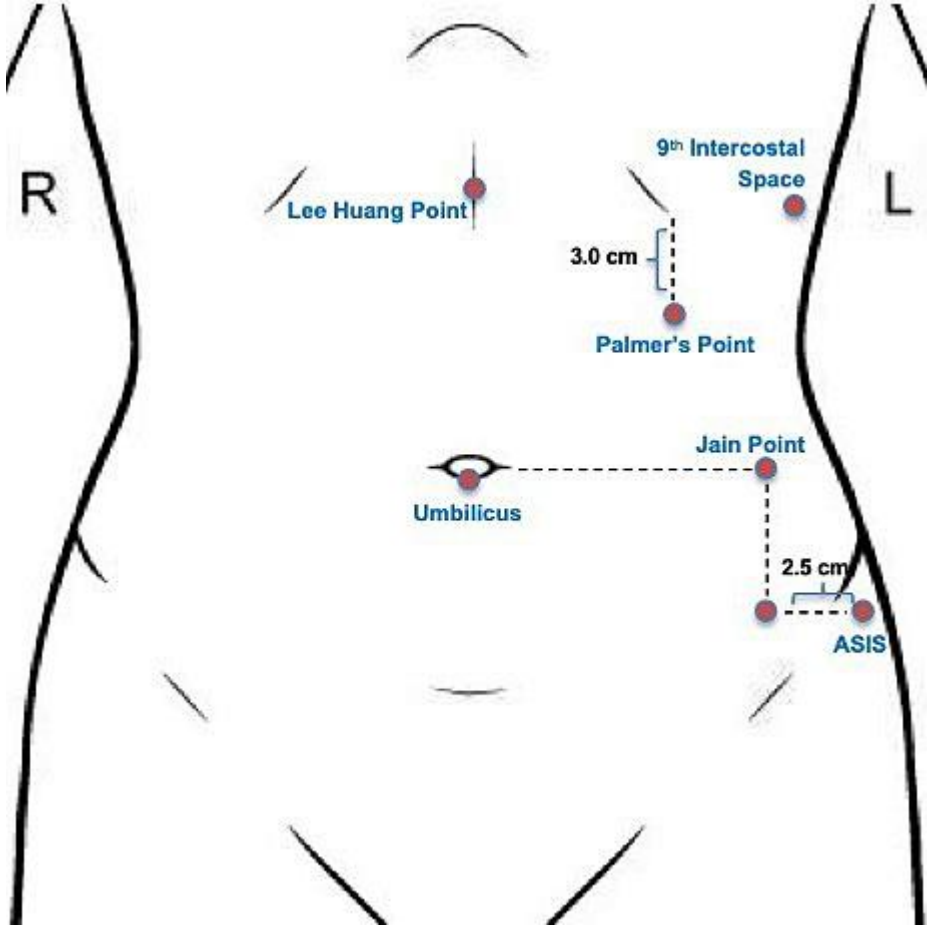
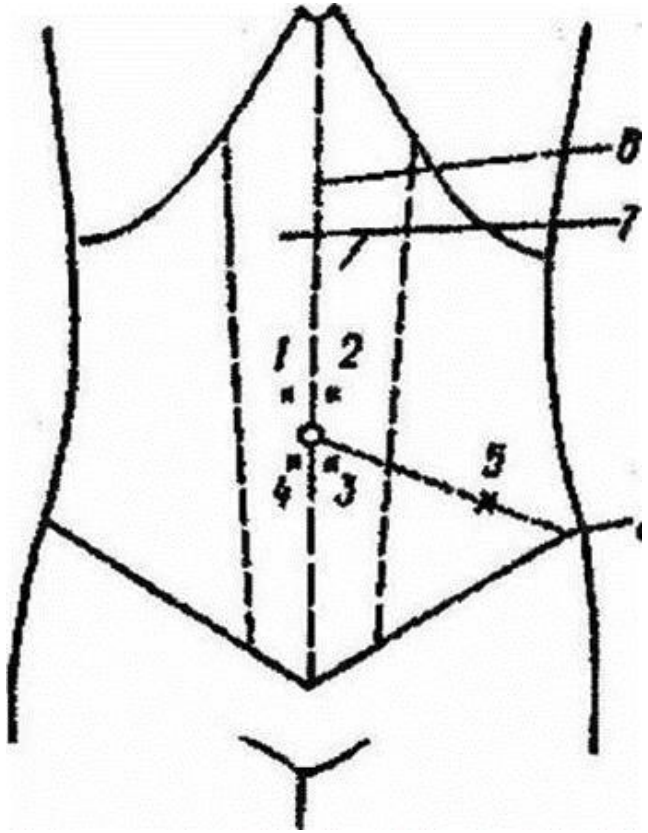
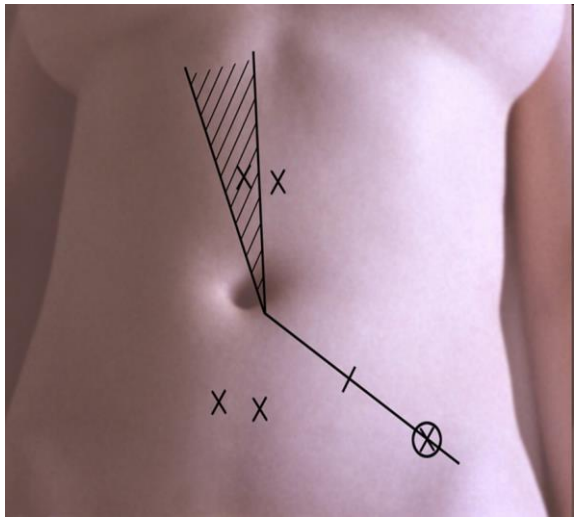
Laparoscopic surgery

Access Points

As previously mentioned, the creation of pneumoperitoneum is critical in performing laparoscopic surgery, and proper technique is mandatory to establish safe laparoscopic entry. Initial trocar entry site is based on surgeon's preference and comfort, patient's surgical history, and patient anatomy. Common entry points include umbilical, left upper quadrant or Palmer's point, right upper quadrant, mid-abdomen (Lee Huang point), vaginal or uterine fundus, and Jain's point







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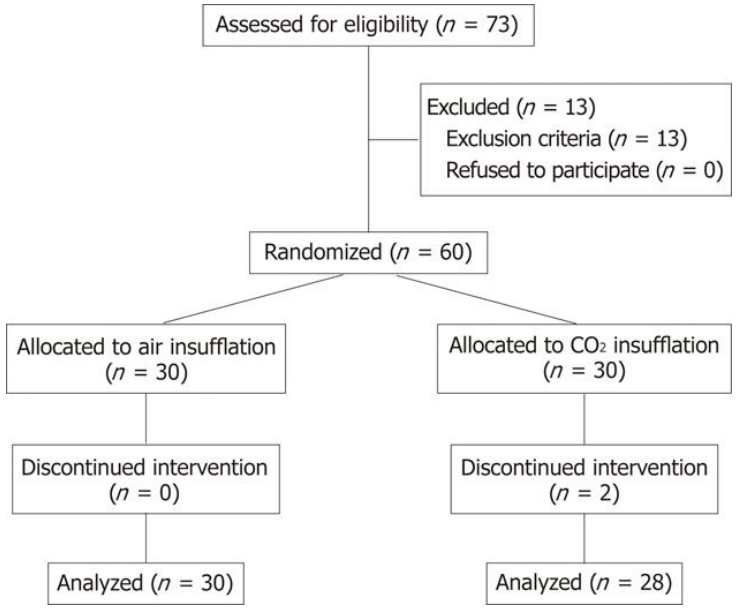
Insufflation gas (for applying pneumoperitoneum) - CO_2

Dignities:

1. It is not capable of ignition
2. High solubility (easily and quickly absorbed)
3. Additionally irritates DC (increasing heat);
4. It is quickly excreted when breathing;
5. Does not cause an embolism
6. Low price
7. Availability

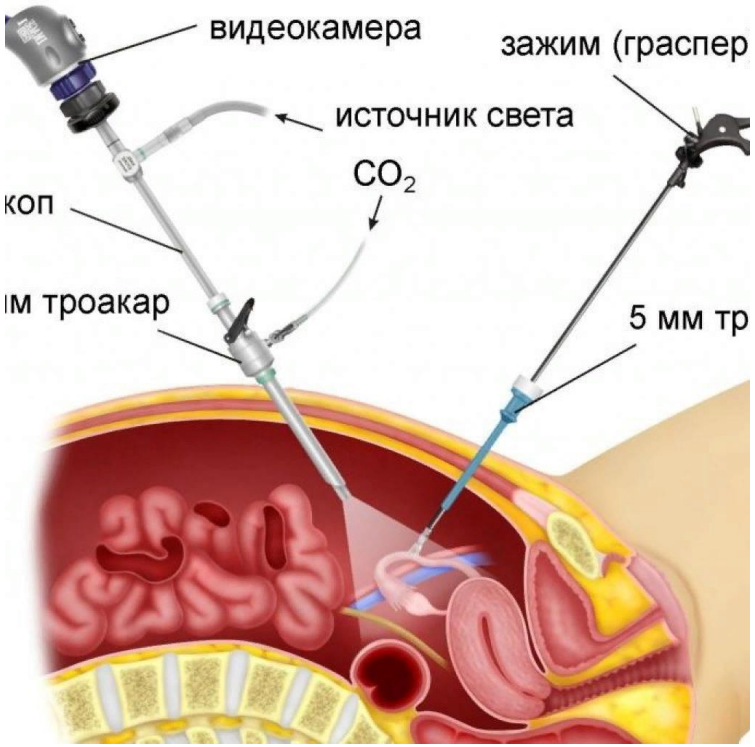
Disadvantages:

1. The potential for the development of metabolic acidosis



Aspirator-irrigator

Electrosurgical unit



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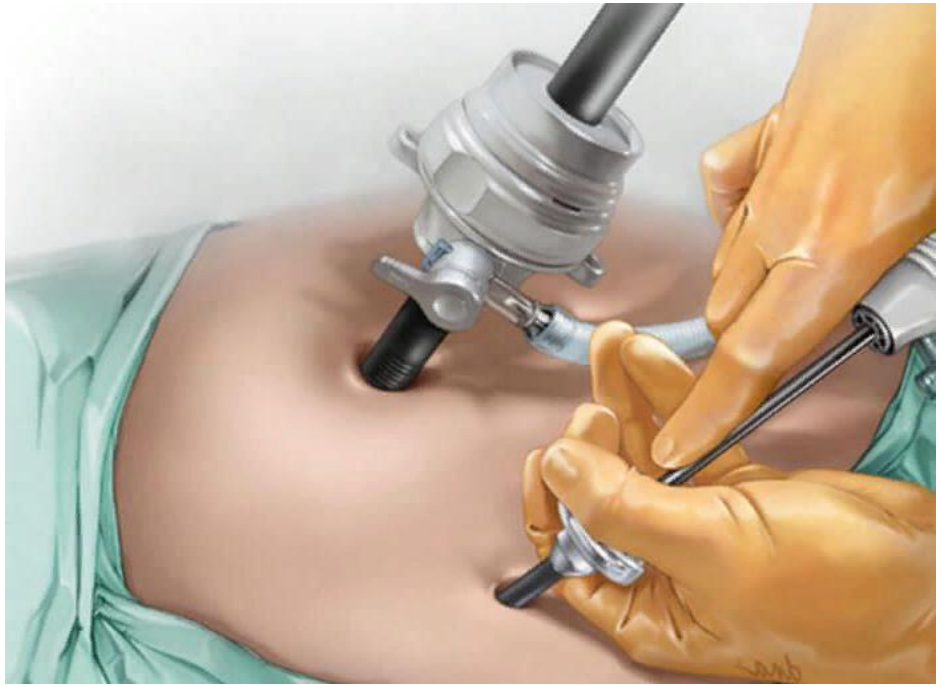
Laparoscopic surgery

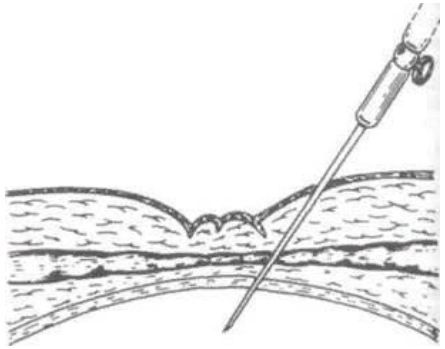
Endoscopic surgery consists of three main stages:

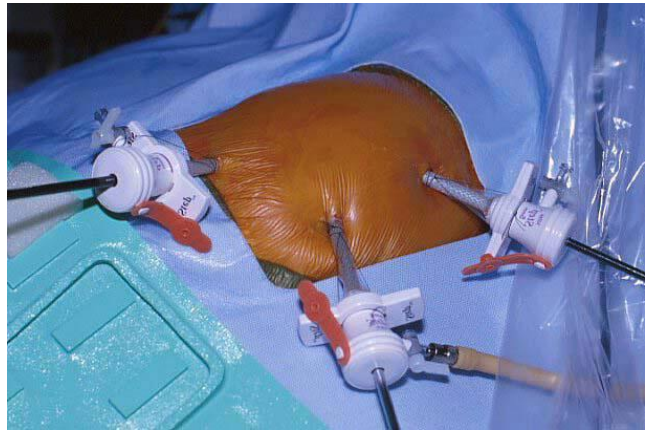
1. Operative access (1 – application of pneumoperitoneum (carboxyperitoneum), introduction of the first trocar and revision of the abdominal cavity; 2 – creation of exposure).
2. Operative reception (surgical intervention).
3. Exit the operation (completion of the operation)



Laparoscopy technique:

1. Creation of laparoscopic access: intra-umbilical incision, insertion of a Veresh needle, creation of a pneumoperitoneum, extraction of a Verish needle, introduction of the main trocar with a telescope and secondary trocars into the right and left iliac regions with manipulators.
2. Visual examination and assessment of the condition of the pelvic organs.
3. Performing the main surgical procedure.
4. Removal of the macropreparation from the abdominal cavity.
5. Abdominal lavage with underwater hemostasis control.
6. Removal of trocar sleeves under visual inspection of puncture sites.
7. Suturing the anterior abdominal wall.





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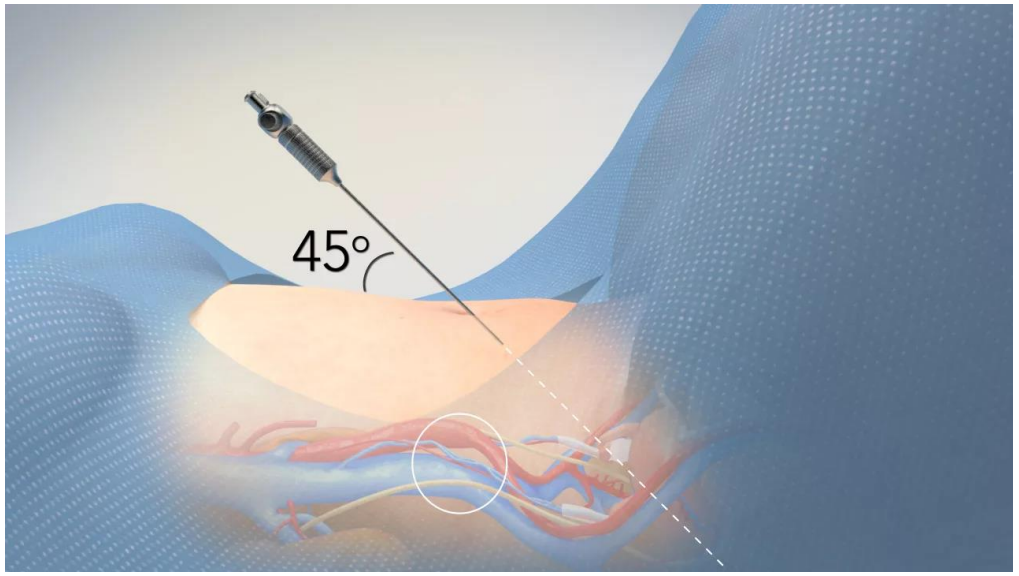
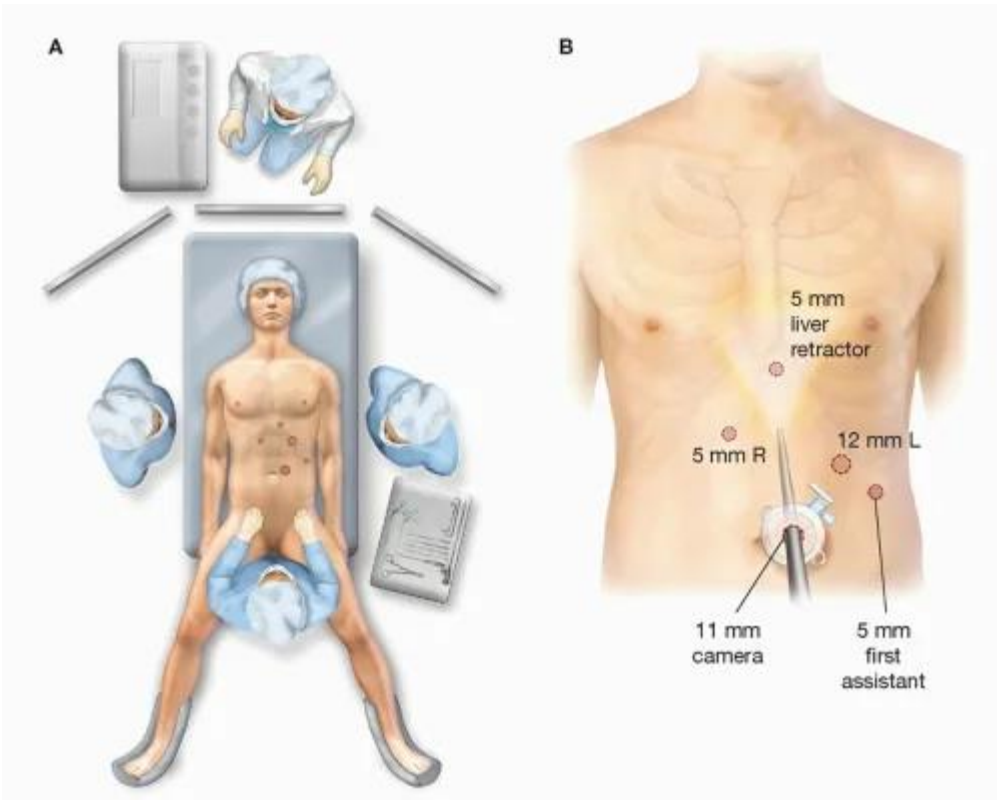
Laparoscopic surgery

Operative access application of pneumoperitoneum (carboxyperitoneum)





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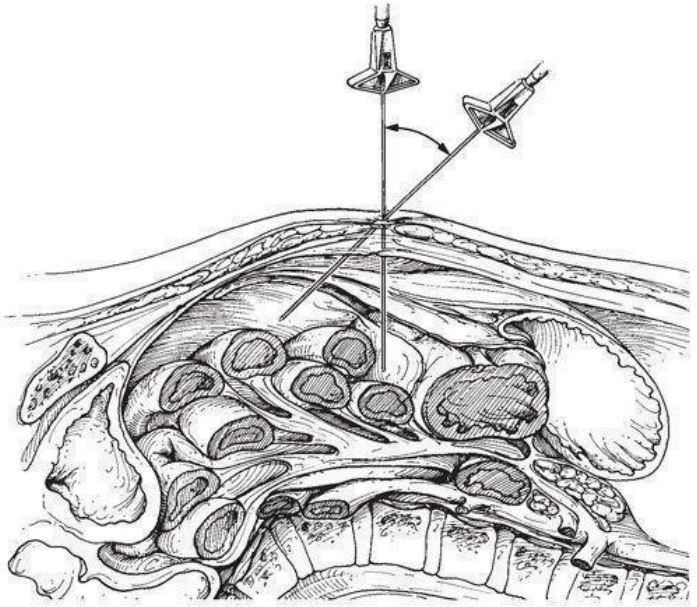
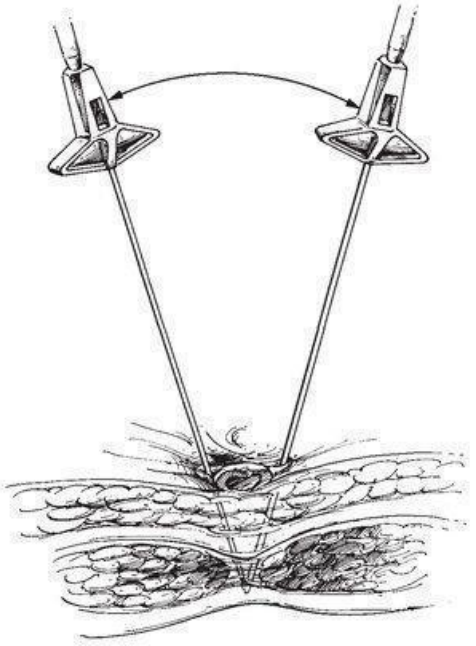
The method of inserting a Veresh needle





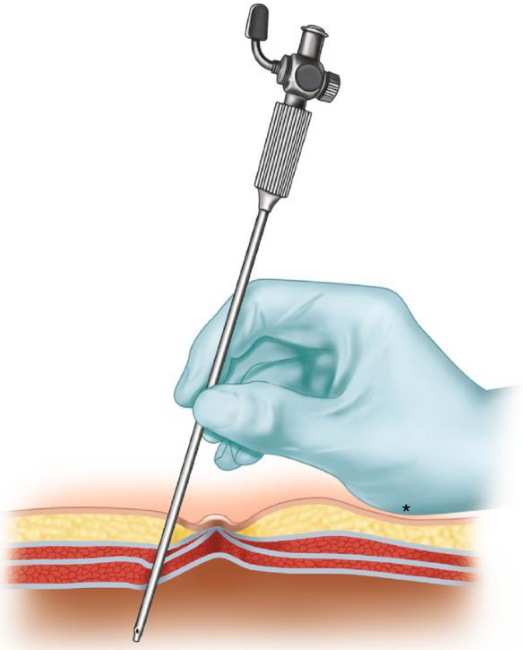
A 2-3 cm long skin incision is made at the intended point of insertion of the needle and the first trocar. The direction of the incision is chosen based on cosmetic considerations. After dissecting the skin and performing hemostasis, the anterior abdominal wall is lifted by a cap. By moving the brush, the puncture needle is passed through the abdominal wall. Tactile during the puncture, the passage of the needle of aponeurosis and peritoneum is felt.

In this case, the needle spring makes two visible movements:

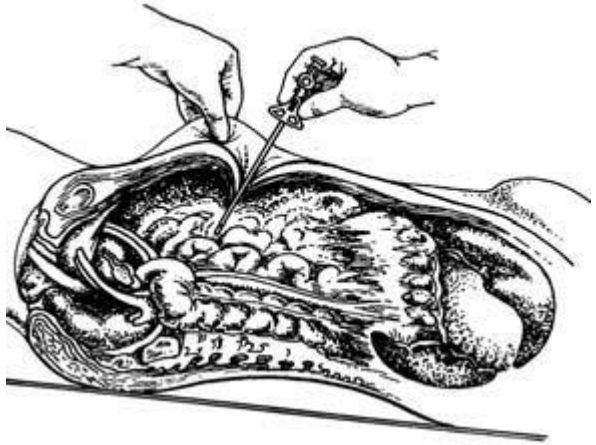
1) when passing through aponeurosis;
2) when passing through the peritoneum.

To determine the correct position of the Veresh needle after the puncture, the following samples are used:

1. The hiss test.
2. The Palmer test.
3. Aspiration test.
4. Negative pressure test.
5. Insufflation pressure test.
6. Intra-abdominal pressure test.



Veress entry



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The method of introducing a trocar

After successful insertion of the Veresh needle and application of pneumoperitoneum to 14 mmHg, the first trocar is introduced.

Its introduction into the abdominal cavity (usually in the paraumbilical region and at the same point as the Veresh needle) is carried out blindly.

Direct puncture of the abdominal cavity with a trocar, without applying pneumoperitoneum, is prohibited due to the high risk of damage to the intestines and blood vessels.

The method of introducing a trocar by Hasson

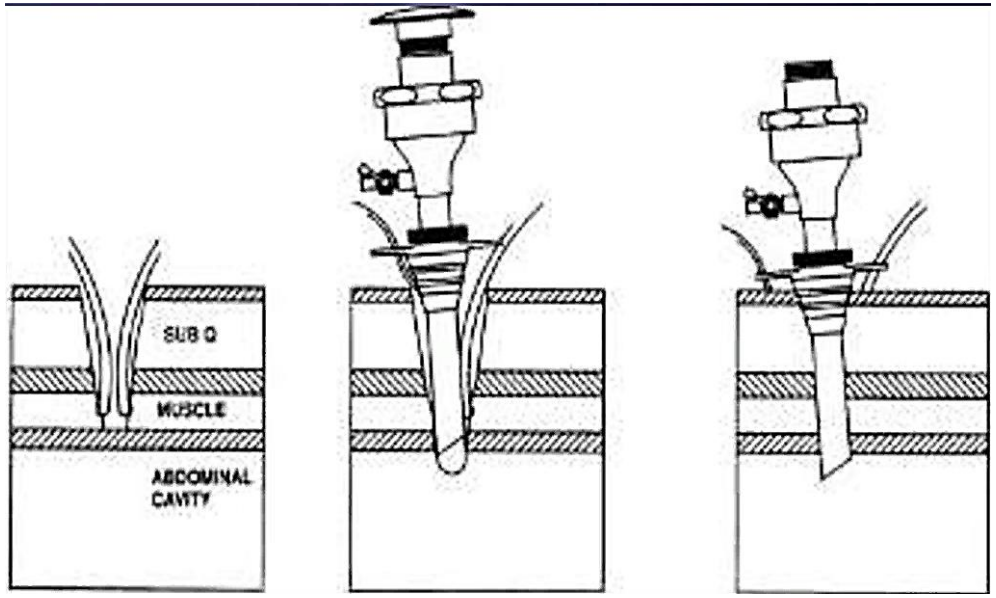
This technique provides for:

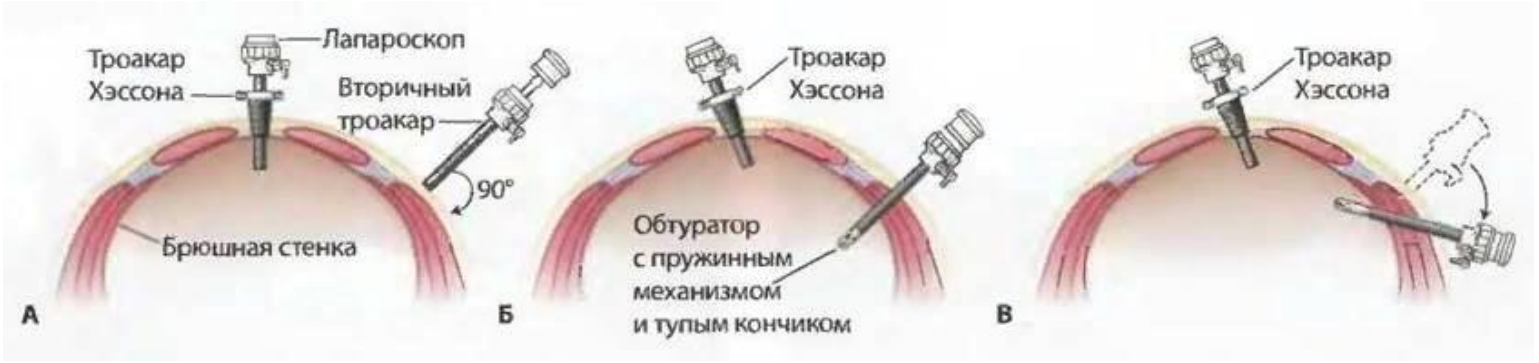
– performing a 3-4 cm long minilaparotomy;

– installing a specialized Hasson trocar into the abdominal cavity in an open way;

– hermetic suturing of the wound around the Hasson trocar.

The trocar, which has a conical shape, is tightly fixed with the same threads that were used to suture the laparotomy wound. After that, carbon dioxide is insufflated into the abdominal cavity through the trocar. This method of applying pneumoperitoneum can significantly reduce the likelihood of damage to organs and vessels of the abdominal cavity.





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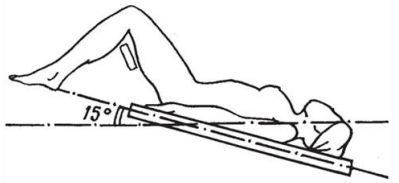
Location of the patient

Exposure is the creation of favorable access to tissues, which allows performing certain surgical manipulations.

- Положение Тренделенбурга (Trendelenburg position)



- Положение Фаулера (reverse Trendelenburg positior

- Наклон на бок (20-30°)

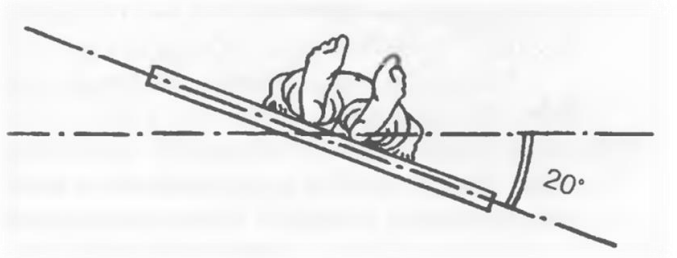


Fig. Trendelenburg Position

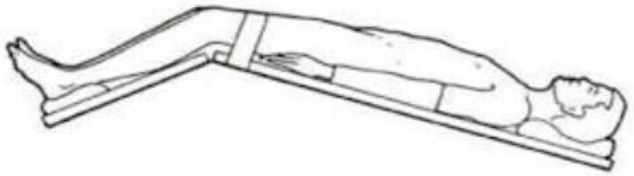
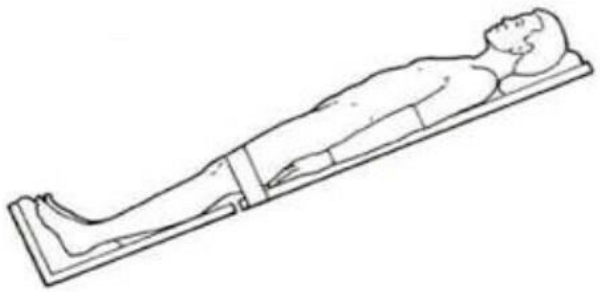


Fig. Reverse Trendelenburg Position



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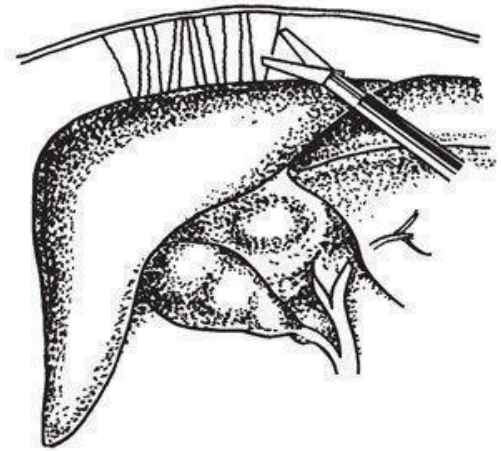
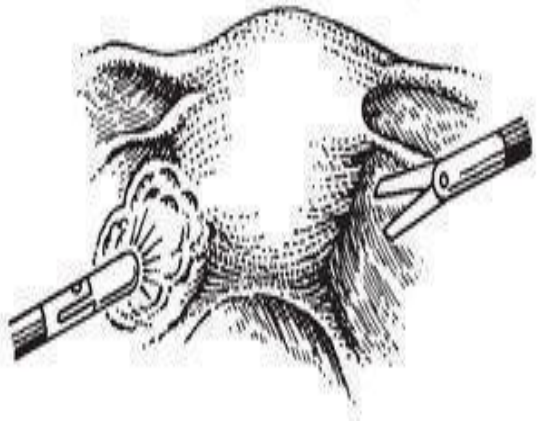
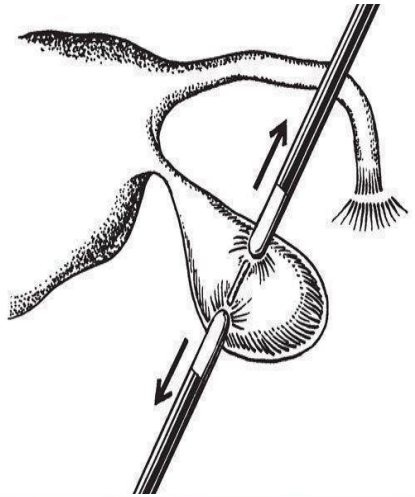
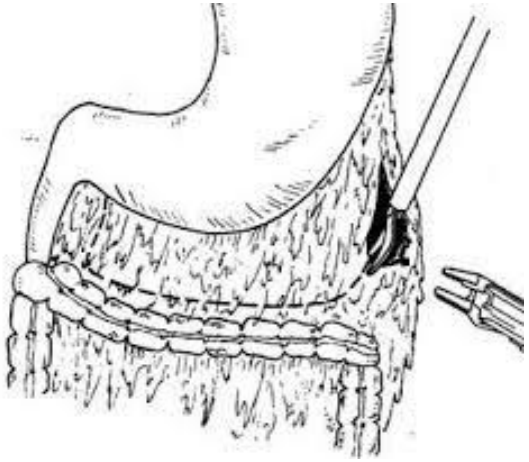
Laparoscopic surgery









Traction and counter-traction

(traction and counter-traction) of tissues and organs is used to create the exposure necessary for surgical manipulations. Its main purpose is to bring the operated organ to the position of the best visualization..

The following options are possible:

– fabrics are fixed and stretched in a natural way at two opposite points;

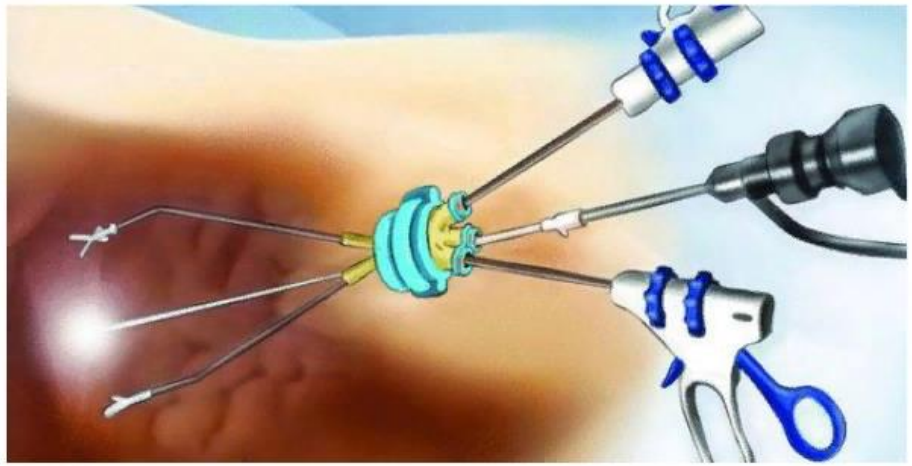
– fabrics are fixed in a natural way at one point and with a tool at the second;

– tissues have free mobility in the abdominal cavity and are fixed by instruments at two points.

SEPARATION OF TISSUES

Endosurgical tissue separation can be performed in several ways:

1) sharp, mechanically – with scissors.
2) blunt – dissector, tupfer;
3) high–frequency electric current using power tools - simultaneous monopolar dissection and coagulation.



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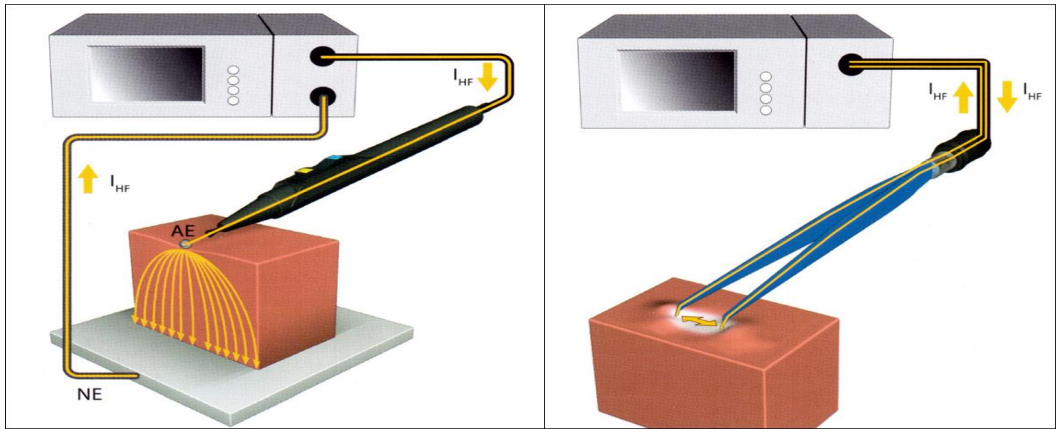


It is carried out in various ways – coagulation, clipping and ligation.

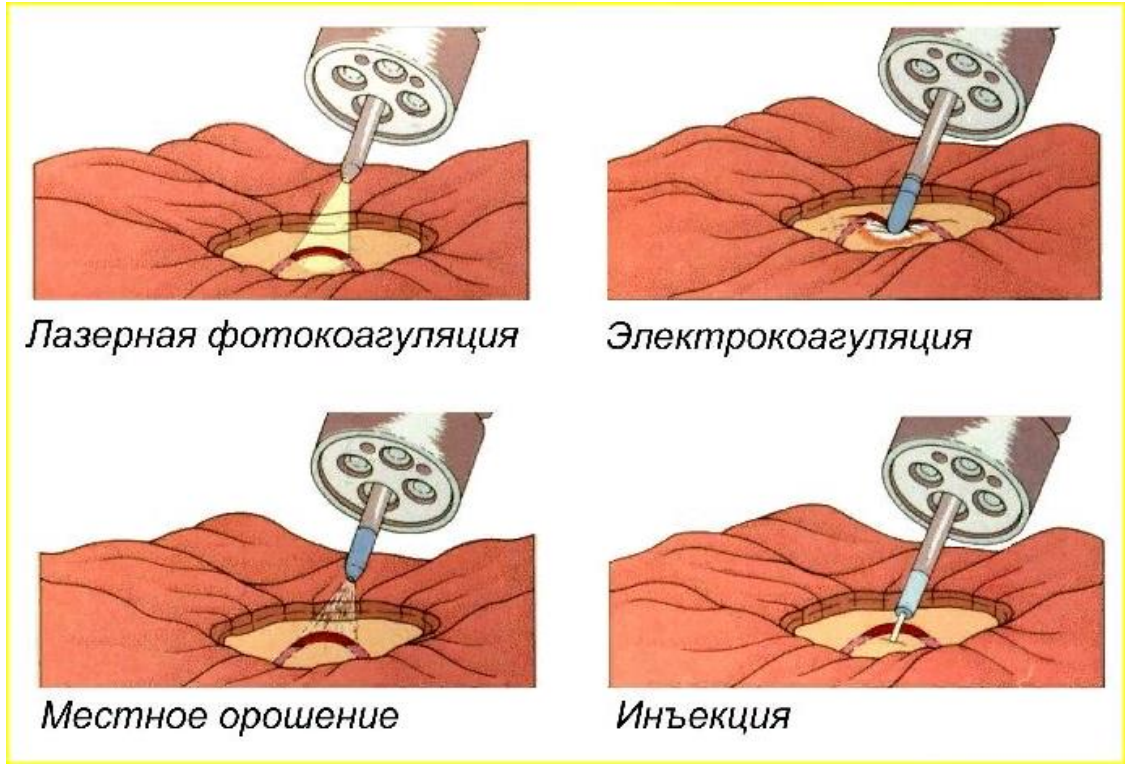
The most commonly used are monopolar and bipolar coagulation.

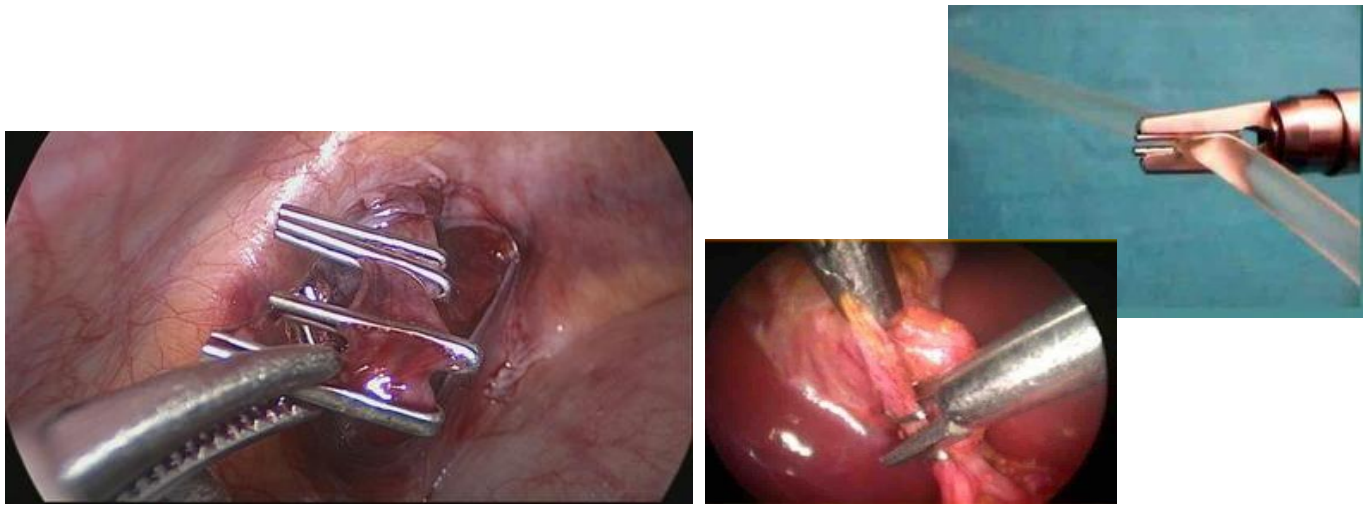
Coagulation should be carried out at the lowest possible values of electric current power and in the shortest possible time.

Clipping is most often used to stop bleeding from relatively large vessels. There is a distinction between temporary and final hemostasis.

Another type of hemostasis is **ligation** using a ligature material.

The ligature material is carried out around the ligated vessel either by means of a clamp, if this vessel is already mobilized, or by means of a needle.Tying is done by applying a knot.





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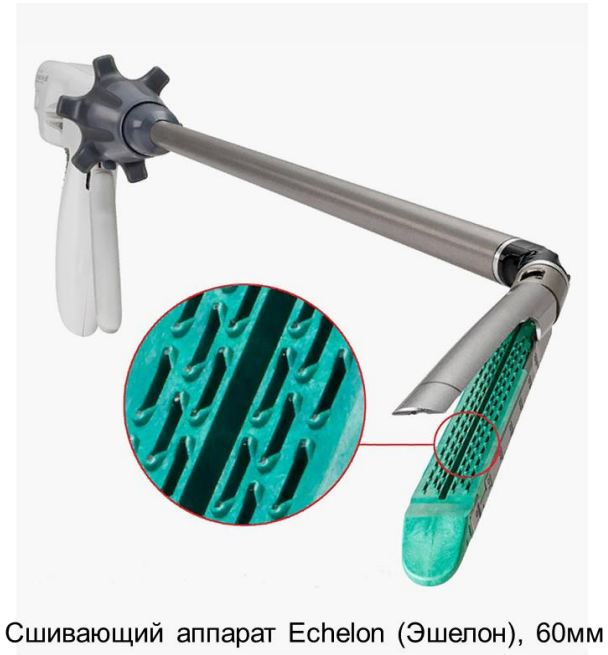
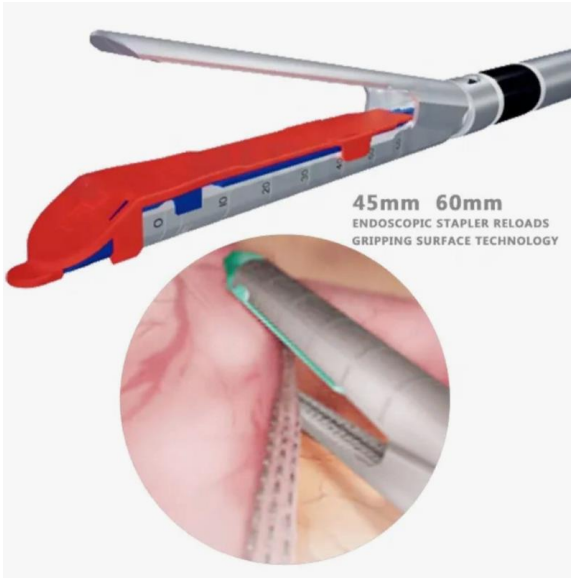
Tissue connection

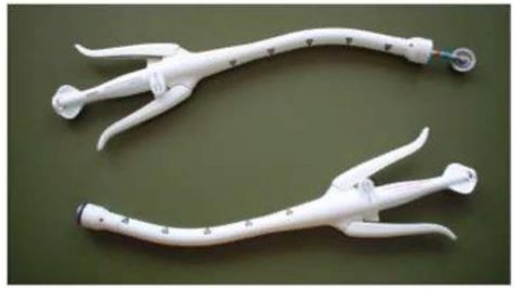
The connection of tissues in endoscopic surgery can be carried out both by mechanical stitching and by gluing tissues. The mechanical seam is carried out by stitching fabrics with needles, stapler staplers and stitching devices

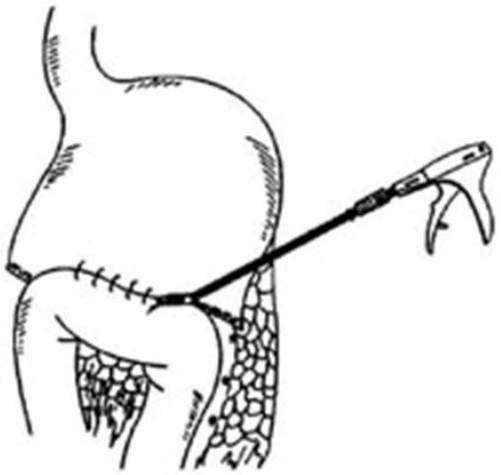
Сшивающий аппарат серии TA DST



Сшивающий аппарат Echelon (Эшелон), 60мм







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End of endoscopic surgery

At the end of the operation, the following manipulations are performed:
-sanitation of the abdominal cavity
-extraction of a removed organ from the abdominal cavity
-desufflation and removal of trocars.

DESUFFLATION AND REMOVAL OF TROCARS

Desufflation is performed by opening the trocar valve. There is no need to completely remove the gas from the abdominal cavity, since it completely resolves within 7-30 days.

Trocar removal is performed strictly under visual control to prevent possible trocar bleeding

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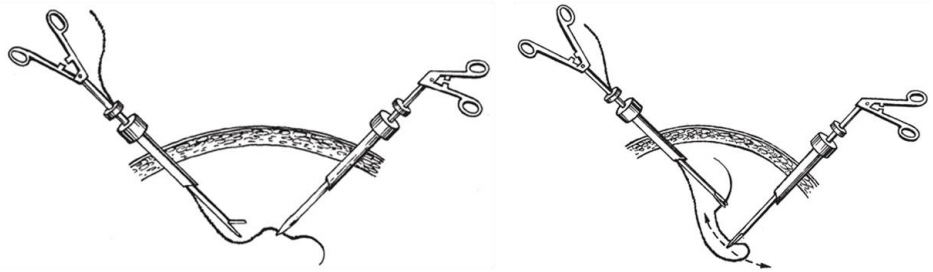
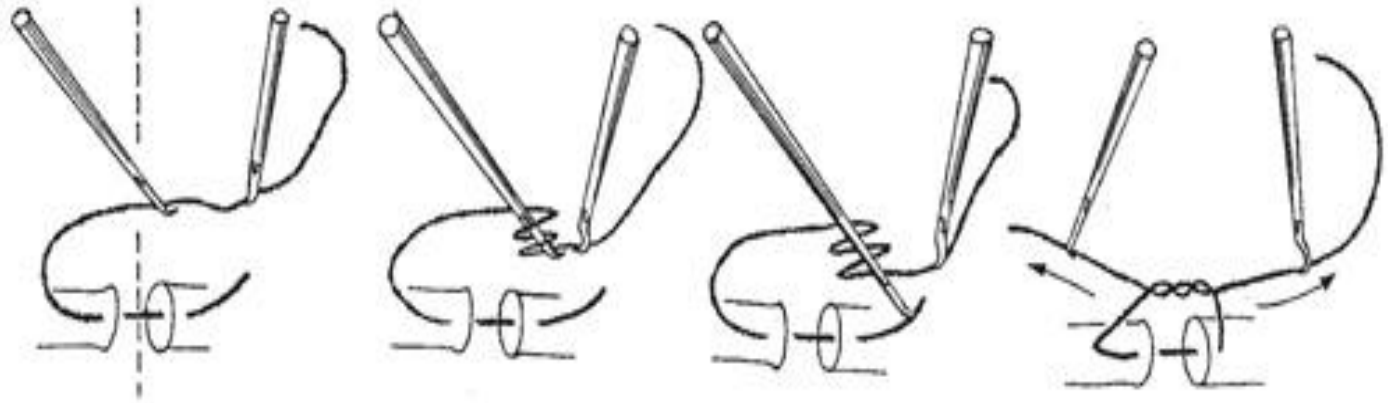
Intracorporeal suture

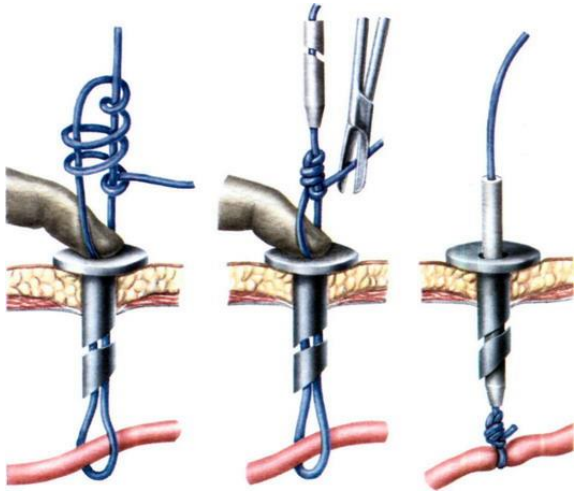


Intracorporeal node formation

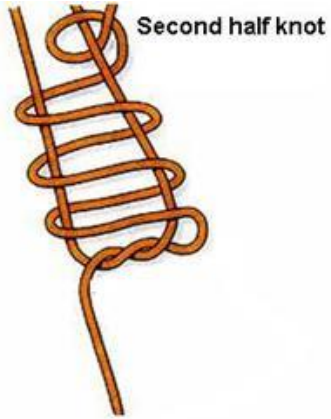
1. Surgical Node (2-1-1)
2. Sliding "square" node



Extracorporeal node formation



Meltzer knot (2-3-2)



Direct extracorporeal node