

with critical period of 72 hours. Fluid and electrolyte management, cardiac management are important aspects to be monitored and treated.

6. Injury to external laryngeal nerve causes weakness of cricothyroid muscle leading to alteration in pitch of voice.
7. Hypothyroidism. Revealed clinically after 6 months.
8. Wound infection, stitch granuloma formation.
9. Keloid formation.

CRYOSURGERY

- It is the destruction of tissues by *controlled cooling*.
- System contains an automatic defrosting device with a cryoprobe.

Gases used are

1. Nitrous oxide – minus 98 degree temperature.
 2. CO₂—minus 60°.
 3. Liquid N₂—minus 180°.
 4. Freon—minus 190°.
- Commonly used is nitrous oxide as it is easily available, cheaper and achieves optimum temperature required for different procedures.

Mode of Action

1. It produces intracellular crystallization, dehydration and denaturation of proteins and cell death.
2. It causes the obliteration of microcirculation and so cell death.

Indications

- To remove warts and lesions in the skin.
- Cryotherapy for piles.
- For chronic cervicitis.

Advantages

- Relatively bloodless and painless.
- Adequate control of extent and depth in freezing.
- Equally effective.

Disadvantages

- Infection.
- Discharge from the site.

LASERS IN SURGERY

(Light Amplification Stimulated Emission of Radiation)

Molecules are placed in a compact area and power is passed through this so as to activate the molecules. Molecules get activated at different periods and move in different directions, which they hit to each other releasing energy. This energy is allowed to act through optical system to the area wherever required.

- Depending on the molecules used it is named.
- Argon Laser.
- Yttrium-Aluminium Garnet Laser (YAG Laser).
- CO₂ Laser.
- Neon Laser.
- Holmium laser.
- Erbium laser.

Uses of Laser

- In *cranial surgery* in children.
- In *ENT* to treat vocal cord lesions, Laryngeal lesions.
- In *ophthalmology* it is very useful in retinal surgery like for detachment,
 - Iridotomy,
 - Dacrocystitis,
 - Capsulotomy,
 - To liquefy human lens,
 - In glaucomas, etc.
- In *General surgery*:
 - In bleeding duodenal ulcer.
 - For palliative decoring of tumors in carcinoma oesophagus.
 - In carcinoma rectum.
 - In haemorrhoidal treatment (1st and 2nd degree).
 - In bladder tumour resection.
 - In cervical cancer.
 - To achieve bloodless field.
 - In varicose veins – Endo Venous Laser Ablation (EVLA)

Often in making incisions in abdomen and other places.

Advantages of Laser

Blood less field.

Faster.

Small lesions can be removed easily and completely.

Precautions

All reflecting instruments should be avoided otherwise laser will reflect and can injure normal tissues or the working team in the OT itself.

All should wear protective spectacles to protect their eyes.

Disadvantage

Availability and cost factors.

STAPLERS IN SURGERY

Staplers are used for apposition of tissues. Used in skin, bowel, lungs, etc.

Types

Cutaneous staplers give clean apposition. It is faster and technically easier. Problem is removal requires specific instrument and costlier than sutures.

Linear staplers are used to close the bowel either completely or partially.

Circular staplers also called as EEA Stapler—End to End Anastomosis. It is commonly used for colorectal anastomosis in Anterior resection for carcinoma rectum, oesophago-gastric anastomosis after oesophago-gastric resection in case of carcinoma at O-G Junction.

Parts are *stapler gun*, and *cartridge* with two rows of stapler pins for apposition. Loaded cartridge is detachable. Cut ends of bowel are placed over *gun and cartridge*. Once gun is shot, cartridge moves to the gun and creates anastomosis.

GIA stapler (Gastrointestinal anastomosis stapler) for *side to side* anastomosis like small bowel or ileo-colic anastomosis.

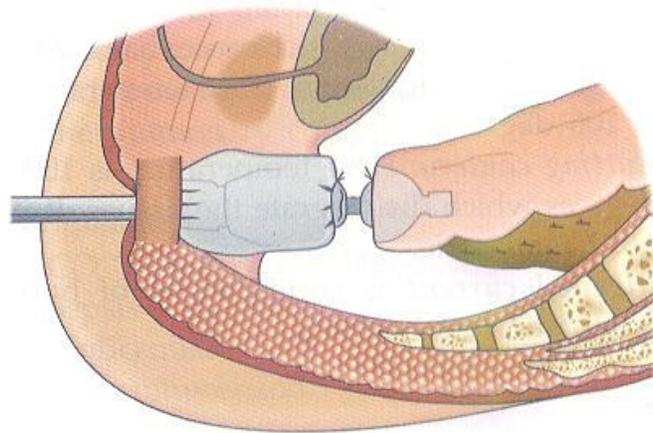


Fig. 7.27: Circular stapler for colorectal anastomosis.

5. **Stapler for lung apposition.**
6. **Endostaplers:** Staplers used during Laparoscopic surgeries. For bowel anastomosis it is commonly used. *Endovascular staplers* are used to ligate vascular pedicles like renal pedicles during Laparoscopic nephrectomy.

Disposable Staplers

Disposable staplers are available but are costly.

Advantages

Technically easier and faster.

Disadvantages

Cost factor, availability.

Problems with Staplers

- It is not completely haemostatic and so bleeding can occur.
- Leak from anastomosis, improper apposition.
- Intestinal obstruction.

DIATHERMY (ELECTROCAUTERY)

It is the method to control bleeding or to cut the tissues during surgery.

Types

Based on type of current.

1. Unipolar cautery.
2. Bipolar cautery. It is safer because its effect is seen only in between electrode points. Adjacent tissues will never get damaged.

Based on type of action:

1. **Coagulation cautery** which causes haemostasis by tissue coagulation. Here temperature is 100 degrees.
2. **Cutting cautery**: Here temperature is 1000 degrees which disintegrate the tissues. It is not haemostatic.
3. **Blended current** is combination of both coagulation and cutting.

Uses

- For coagulation of bleeders during surgery to achieve haemostasis.
- To cut muscles, fascia, etc.
- It is essential for laparoscopic surgical procedures. Bipolar is commonly used.
- It is used to remove small cutaneous lesions, to control bleeding duodenal ulcer.

Disadvantages

- Infection.
- Cauterization of normal tissues.
- Explosive problems.
- Diathermy burn to the patient where diathermy plate is kept.
- Burn injury or electrical shock to surgeon and assisting personnel.

Precautions

- Proper earthing.
- Avoid loose contact of electrodes.
- It should be kept off when not in use during procedure.

LAPAROSCOPIC SURGERY

History

- First laparoscopic cholecystectomy is done by Muhe of Germany in 1985 and by Mouret in Lyon in 1987.
- McKeran and Saye performed first laparoscopic cholecystectomy in USA in 1988.
- First laparoscopic appendicectomy was done by Semm as prophylaxis.
- First laparoscopic appendicectomy for acute appendicitis was done by Schreiber 1987.

- Semm changed 75% open gynaecological surgeries into laparoscopic surgeries.
- Prof. TE Udadia, Mumbai did first laparoscopic cholecystectomy in India.

Advantages of Laparoscopic Surgery

- Relatively less painful compared to open surgery. Trauma of assess is very less.
- Shorter hospital stay and early return to work.
- Faster postoperative recovery.
- Better visualization of the anatomy ie. better approach for dissection and visualization of other parts of abdomen for any other pathology.
- Instrumental assess to different abdominal locations is better many times compared to open method.
- Minimal scar in the abdomen.

Instruments Used

- Zero degree laparoscope is commonly used. Side viewing scopes are also used to have better visualization.
- Cold light source either Halogen lamp or Xenon lamp is used. Halogen lamp is used commonly and is cheaper. Xenon lamp gives high visualization.
- Camera: 3 chip camera is commonly used with high resolution.
- Video-monitor to display images.
- CO₂ insufflator.
- Long fine dissectors like in open surgical techniques.
- Hooks and spatulas are used along with cautery for dissection.
- Clip applicators.
- Needle holder.
- Endostapler.
- Veress needle.
- Suction-irrigation apparatus.
- Trocars of different sizes—10 mm, 5 mm.
- Reducers to negotiate smaller instruments through larger ports.

Preparation

Always general anaesthesia. Other preparations are same as for open method.

Technique

Pressure bandages are applied to both legs to improve the venous return and to decrease the stasis.

Head end of the table is lowered to have easier insertion of veress needle and scope.

Veress' tube and Foley's catheter are must before insertion of the trocars.

Pneumoperitoneum is created using veress needle through umbilical incision. Access can be achieved by open method through an umbilical incision.

CO₂ is used to create pneumoperitoneum commonly.

It is readily available.

It is cheaper.

It suppresses the combustion.

It is easily absorbed by tissues.

It has a high diffusion coefficient.

It is quickly released via respiration.

Other gases used are: Air, Nitrous oxide, Helium, Argon.

Pneumoperitoneum is created up to 15 mm Hg which distends the abdominal cavity adequately to have proper visualization of the abdominal contents.

Laparoscope is inserted through the umbilical port (10 mm). Abdomen is evaluated for pathology. Liver, gallbladder, pelvic organs are visualized.

Additional ports (3-4) through trocars depending on the procedure to be done are placed. It may be either 5 mm port or 10 mm port. These ports are placed in such a way to have a proper triangulation of instruments for dissection.

To use clip applicator 10 mm port is required.

Physiologic Changes due to pneumoperitoneum

CO₂ causes hypercarbia, acidosis and hypoxia.

Pneumoperitoneum due to pressure on the IVC decreases the venous return and so the cardiac output.

- It increases the arterial pressure also.
- It compromises the respiratory function by compressing over the diaphragm impairing the pulmonary compliance.

Complications

- CO₂ Narcosis and Hypoxia.
- Sepsis – Subphrenic abscess, Pelvic abscess, septicemia.
- IVC compression.
- Bleeding.
- Leak from the site, e.g. bile leak.
- Organ injury during insertion of ports, e.g. major vessels, bowel, mesentery, liver.
- Subcutaneous emphysema and pneumomediastinum formation.
- Gas emboli though are rare but fatal.
- Postoperative shoulder pain due to diaphragmatic irritation.
- Cardiac dysfunction due to decreased venous return.
- Injury to the abdominal wall vessels and nerves.
- Cautery burn to abdominal structures.
- Abdominal wall hernias.
- Wound infection.
- Mortality – 0.5 %.

Relative Contraindications

- Cardiac compromised patient.
- Peritonitis patients.
- Previous abdominal surgeries.
- Bleeding disorders.
- Morbid obesity.
- Pregnancy in third trimester.
- Portal hypertension.

Basic Laparoscopic Surgeries

Laparoscopic cholecystectomy.

Laparoscopic appendicectomy.

LAPAROSCOPIC CHOLECYSTECTOMY

Is fast becoming popular method of treatment.