Abdominal incision

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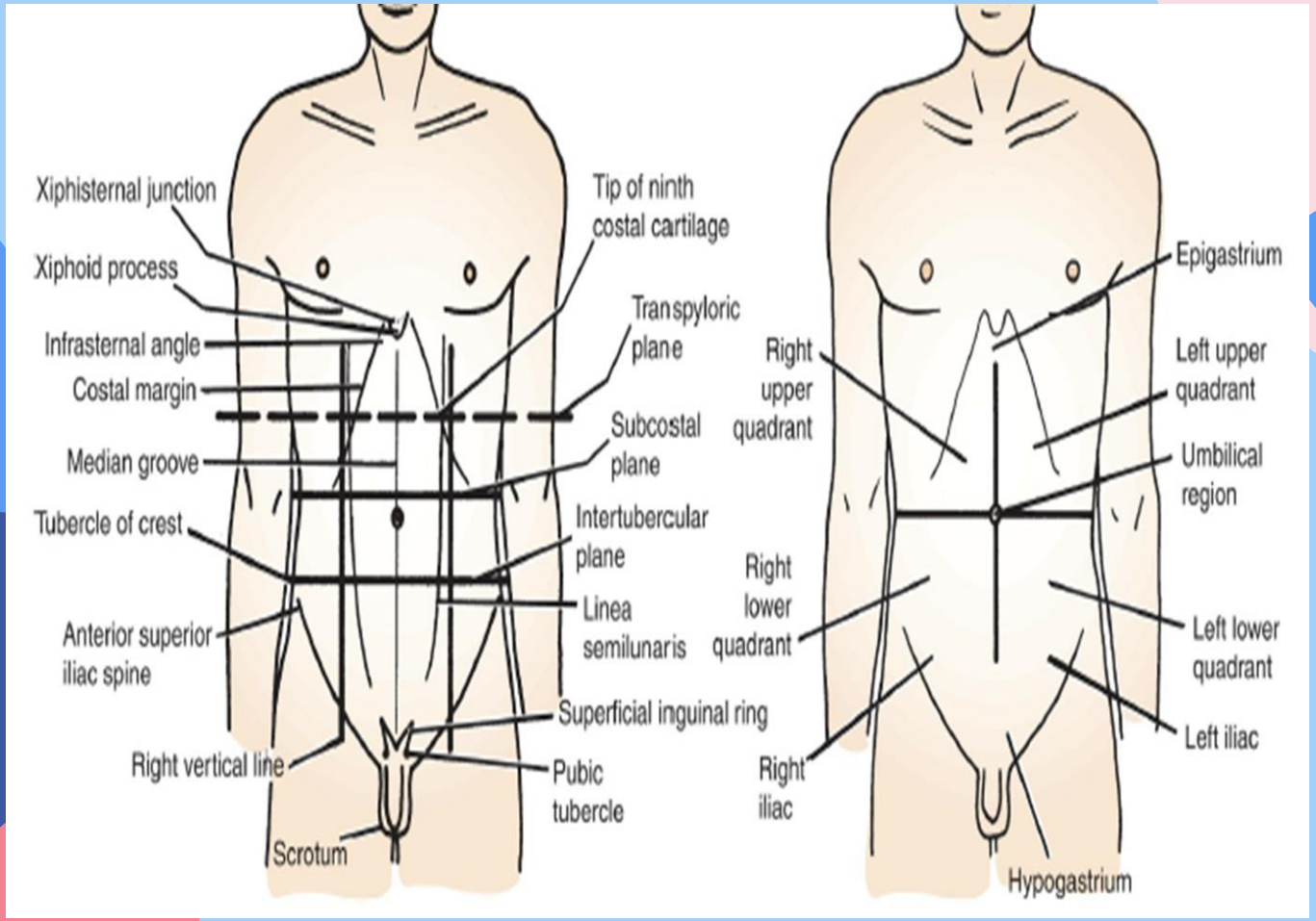
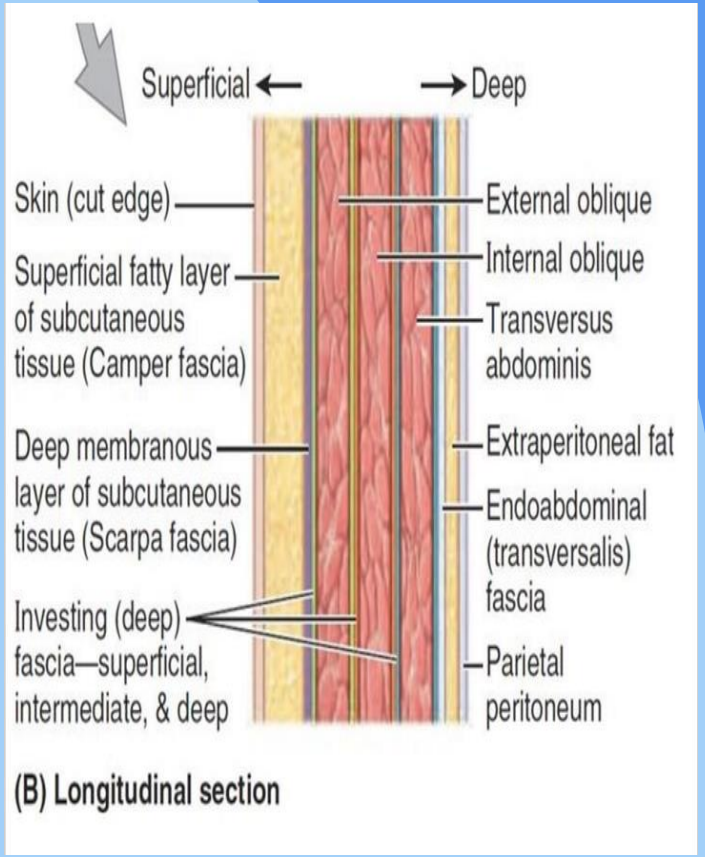
Objectives:

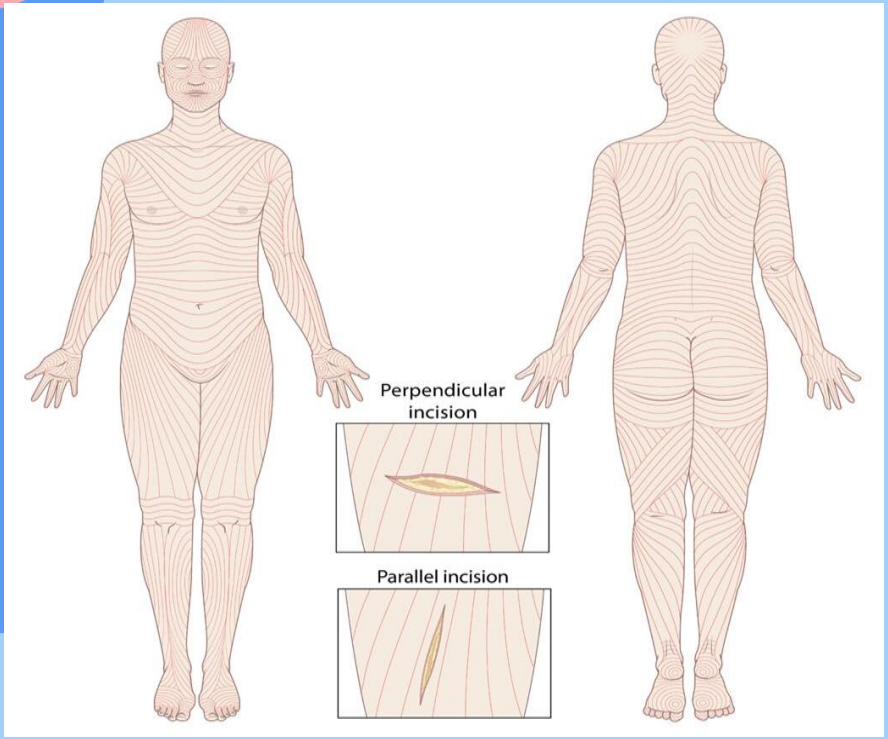
- Outline the different types of incisions used to access abdominal organs.
- Summarize the technique of introducing surgical instruments via the laparoscopic technique
- Describe the benefits of the midline abdominal incision.
- Review the importance of improving care coordination amongst interprofessional team members to ensure that the patient with an abdominal pathology undergoes the appropriate surgical incision


Xiphisternal junction
Xiphoid process
Infrasternal angle
Costal margin
Median groove
Tubercle of crest
Anterior superior iliac spine
Right vertical line
Scrotum
Tip of ninth costal cartilage
Transpyloric plane
Subcostal plane
Intertubercular plane
Linea semilunaris
Superficial inguinal ring
Pubic tubercle
Epigastrium
Right upper quadrant
Left upper quadrant
Umbilical region
Right lower quadrant
Left lower quadrant
Left iliac
Right iliac
Hypogastrium

Layers of the anterior abdominal wall: It is formed of the following layers:

1. Skin
2&3. superficial fascia (no deep fascia).
4. Abdominal muscles.
5. Fascia transversals
6. Extraperitoneal fat
7. Parietal peritoneum





Langer's lines: The topographic lines on the body that correlate with the natural orientation of the reticular fibers of the reticular dermis (lines of skin tension parallel

to the neutral orientation of the collagen fibers

in the dermis and underlying muscle fibers)

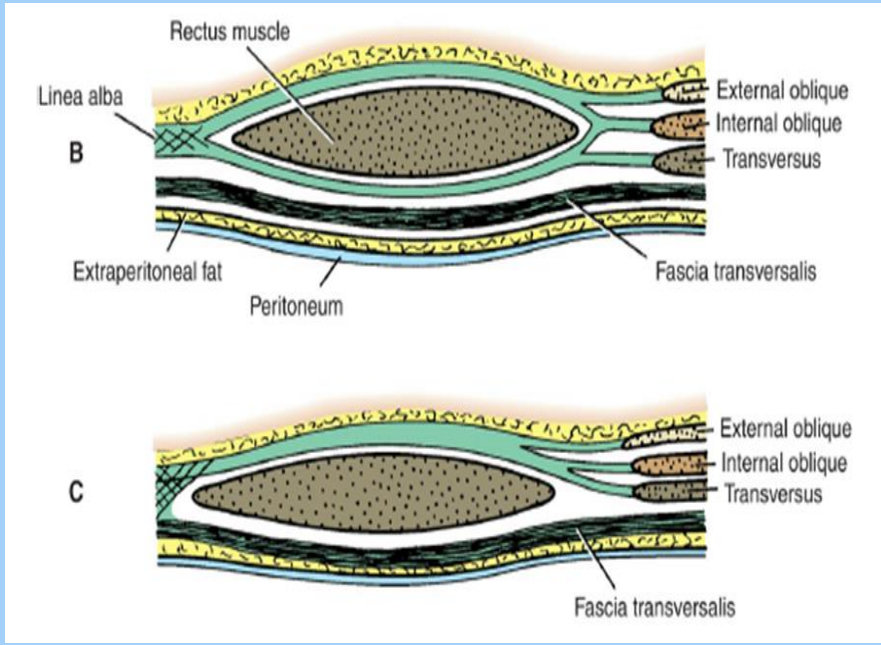
** Used to guide surgical incisions so as to ensure optimal wound healing

Rectus Sheath:

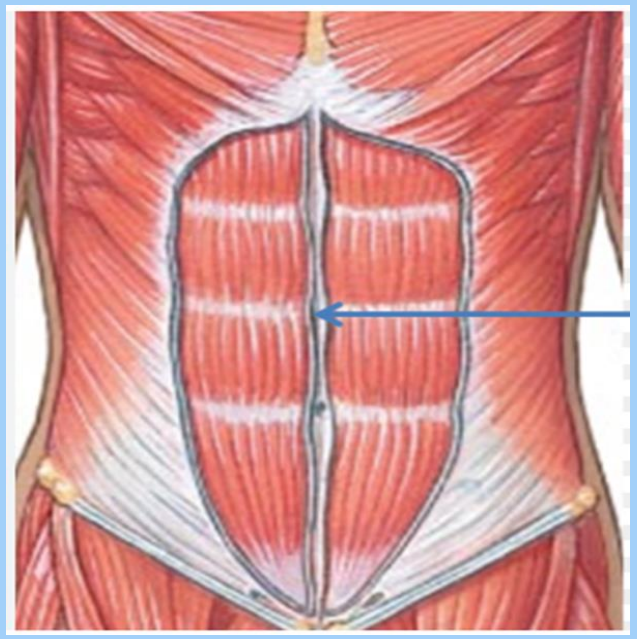
The rectus sheath is a long fibrous envelope that encloses the rectus abdominis and pyramidalis (if present) muscles.

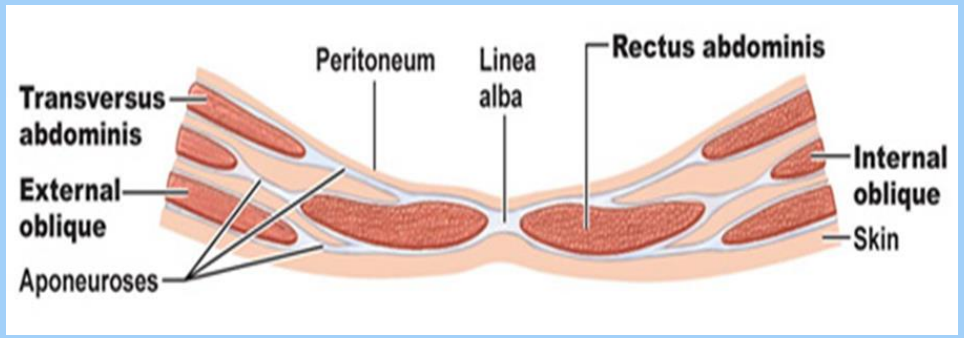
Thus, the sheath has two walls, anterior and posterior.

It also contains the anterior rami of the lower six thoracic nerves and the superior and inferior epigastric vessels and lymph vessels. It is formed mainly by the aponeuroses of the three lateral abdominal Muscles



The rectus sheath is separated from its fellow on the opposite side by a fibrous band called the linea alba. This extends from the xiphoid process down to the symphysis pubis and is formed by the fusion of the aponeuroses of the lateral muscles of the two sides. It is wider above the umbilicus and narrows down below the umbilicus to be attached to the symphysis pubis





The blood supply to the anterior abdominal wall consists of:

1) Superficial branch of femoral artery

a) Superficial epigastric artery.
b) Superficial circumflex iliac artery

2) Terminal branches of the internal thoracic artery:

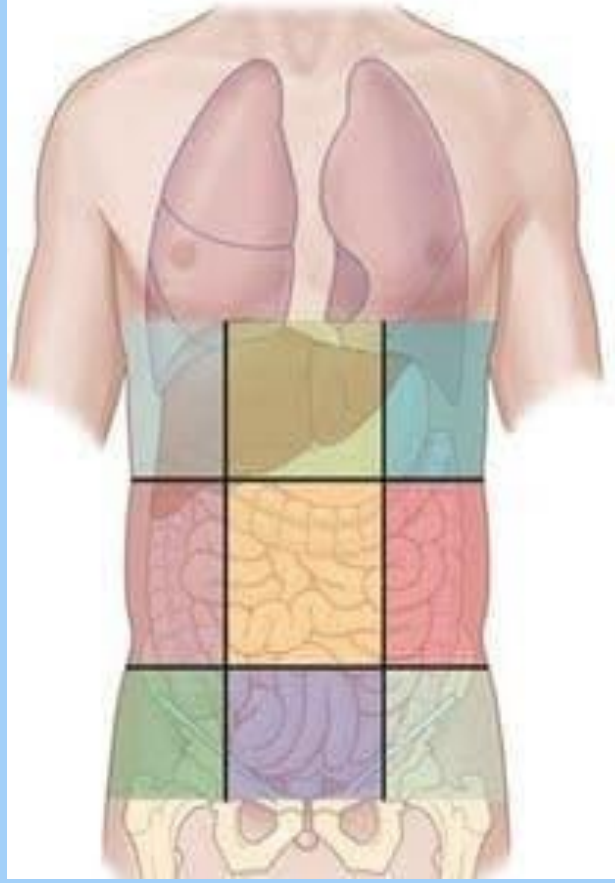
a) Superior epigastric artery
b) Musculo-phrenic artery

3) Branches of the external iliac artery:

a) Inferior epigastric artery
b) Deep circumflex artery

4) lower two posterior intercostal arteries,

5) four lumbar arteries



Right Hypochondriac Region • Liver • Gallbladder • Right kidney	**Epigastric Region** • Stomach • Liver • Pancreas • Right and left kidneys	**Left Hypochondriac Region** • Stomach • Liver (tip) • Left kidney • Spleen
Right Lumbar Region • Liver (tip) • Small intestines • Ascending colon • Right kidney	**Umbilical Region** • Stomach • Pancreas • Small intestines • Transverse colon	**Left Lumbar Region** • Small intestines • Descending colon • Left kidney
Right Iliac Region • Small intestines • Appendix • Cecum and ascending colon	**Hypogastric Region** • Small intestines • Sigmoid colon • Bladder	**Left Iliac Region** • Small intestines • Descending colon • Sigmoid colon

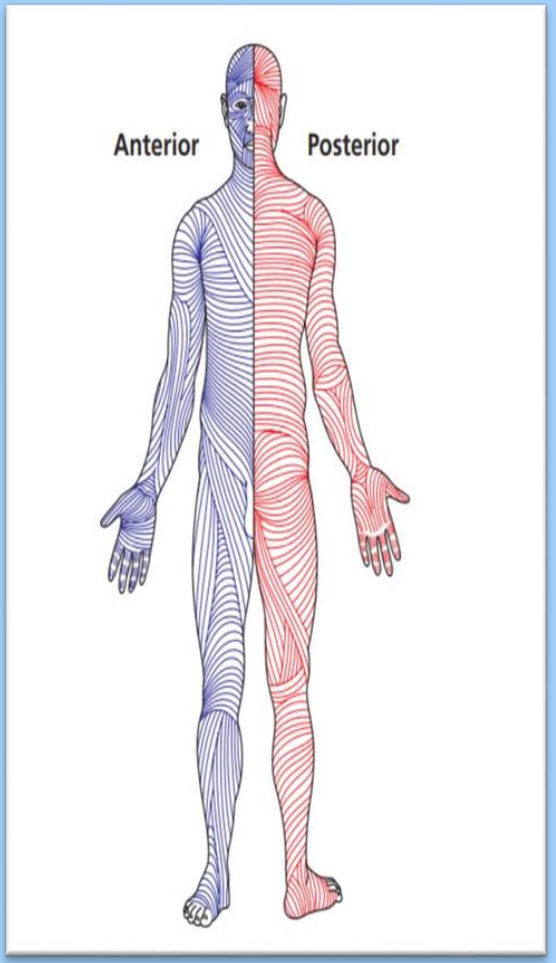
When planning a skin incision, five factors should be considered (criteria for ideal incision):

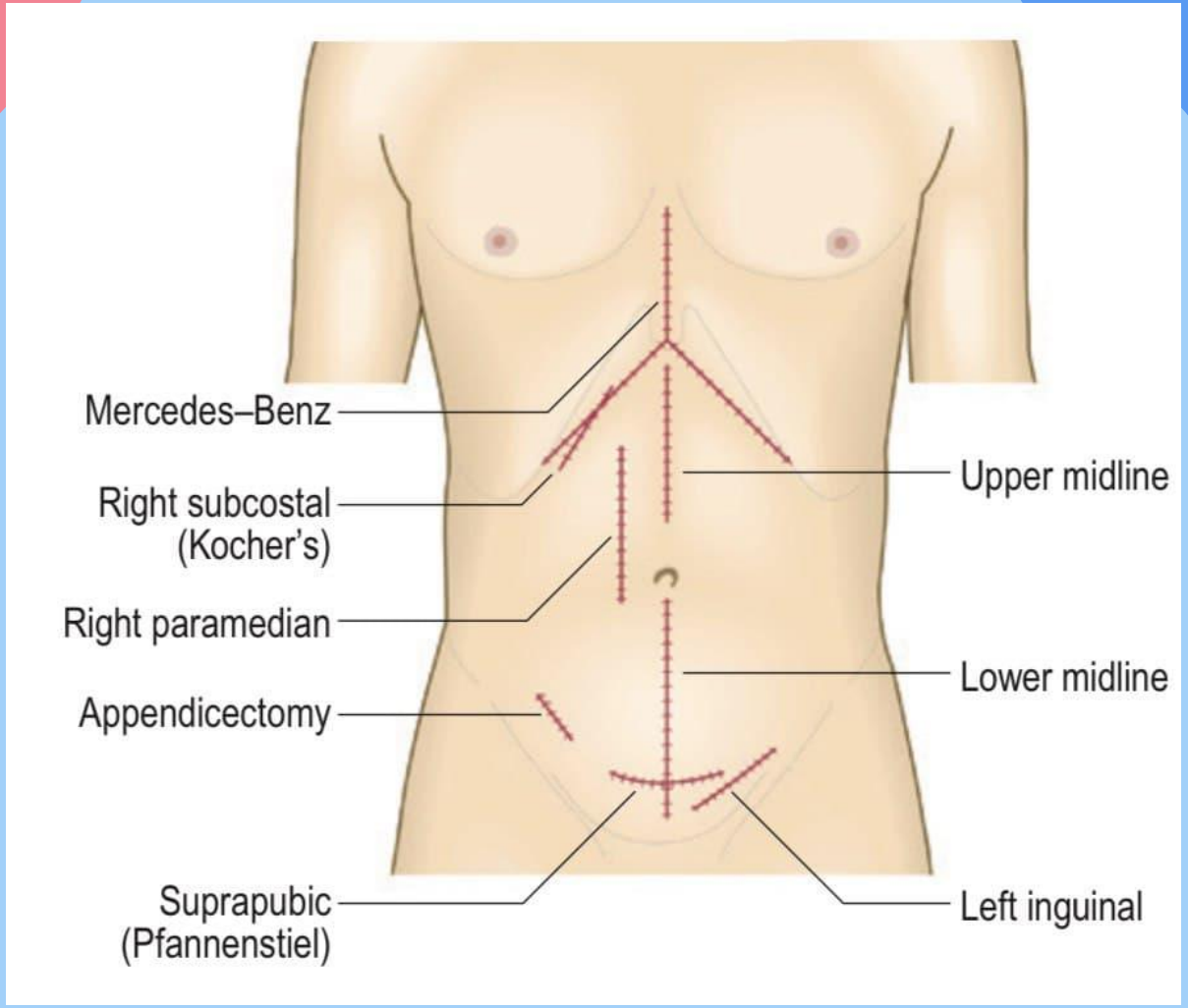
very important!

- 1-. Avoid nerve or vessel injury to avoid paralysis or atrophy of muscles
- 2-Anatomical structure: incisions should avoid bony prominences and crossing skin creases if possible, and take into consideration underlying structures, such as nerves and vessels.
- 3-Cosmetic factors: any incision should be made bearing in mind the ultimate cosmetic result, especially in exposed parts of the body, as an incision is the only part of the operation the patient sees Use Skin tension lines (Langer's lines)

4-Adequate access for the procedure: the incision must be functionally effective for the procedure in hand as any compromise purely on cosmetic grounds may render the operation ineffective or even dangerous.

5-muscle should be split not cut, and being easily opened and closed




Mercedes–Benz
Right subcostal (Kocher's)
Right paramedian
Appendicectomy
Suprapubic (Pfannenstiel)
Upper midline
Lower midline
Left inguinal

Midline Incisions= laparotomy= celiotomy (this is the most traditional of surgical)

1) Incision down the middle of abdomen along and through the linea Alba. .(Upper or lower midline).

2) they can also extend from the xiphoid process to the pubic bone

3) It is easier to perform above the umbilicus because the linea alba is wider in that region.

3)commonly used for exploratory procedures and procedures requiring emergency laparotomy, such as: faecal peritonitis secondary to malignant intestinal perforation, ischaemic bowel, trauma

It will encounter the following layers of tissue:

1-Skin

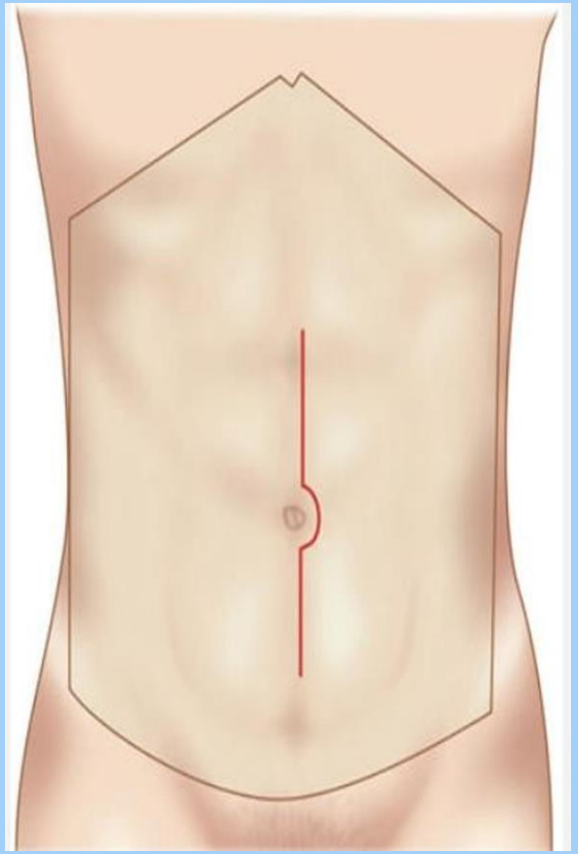
2-Subcutaneous fatty layer (Camper's fascia)

3-Membranous fascia (Scarpa's)

4-Linea Alba* Transversalis fascia

5-Preperitoneal fat

6-Parietal peritoneum



This location is mostly avascular plane and does not impose a great risk to the blood supply. There is rarely nerve damage in this region.

This incision generally provides the best visualization and intra abdominal access

Disadvantages :

patients experiencing more pain than they would from a transverse incision, particularly during deep breathing

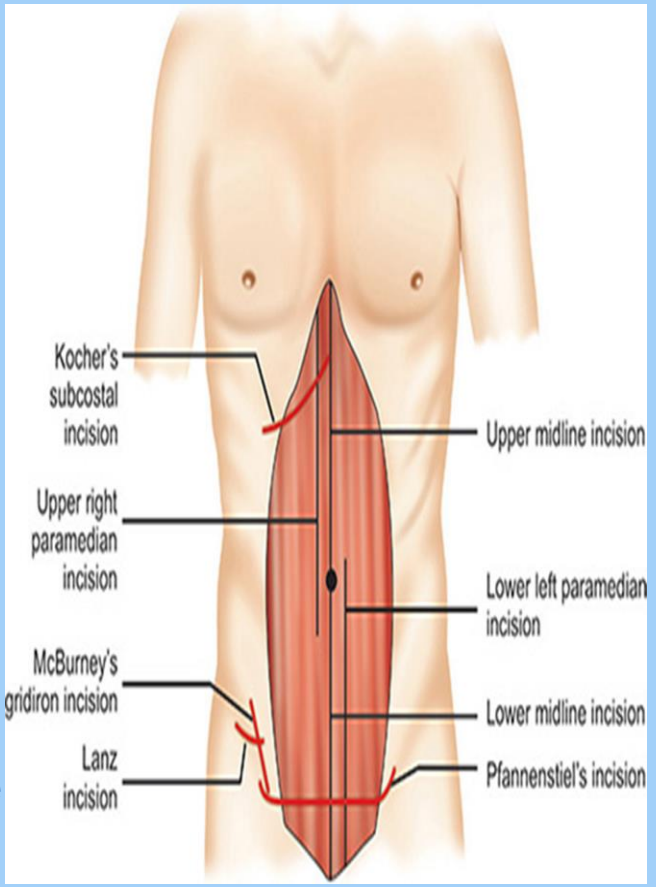
postoperatively, and the incision is perpendicular to the Langer's skin tension Lines resulting in poorer cosmesis.

Immediate complications of a midline laparotomy incision may include anaesthetic difficulties, haemodynamic instability, primary haemorrhage from cut vessels and iatrogenic injury to surrounding tissues and viscera

Para-median Incision

The para-median incision serves to expose lateral viscera such as spleen , adrenal glands and kidneys.
It is made 3cm, on average, lateral to the midline.
The skin and subcutaneous tissue must be incised, the anterior rectus sheath, and the rectus muscle is deflected laterally if possible to expose the posterior rectus sheath if above the arcuate line.
Upon passing the rectus is entry to the peritoneum.
Peripheral branches of the inferior epigastric will undergo ligation.

Two variants are known: the conventional "medial" paramedian incision, in which the rectus sheath and rectus muscles are transected close to the linea alba, and the so-called lateral paramedian technique.
In the latter, a longitudinal incision near the lateral border of the rectus sheath is made. The rectus muscle is freed from the anterior sheath and is then retracted laterally



Supra–umbilical/Infra–umbilical

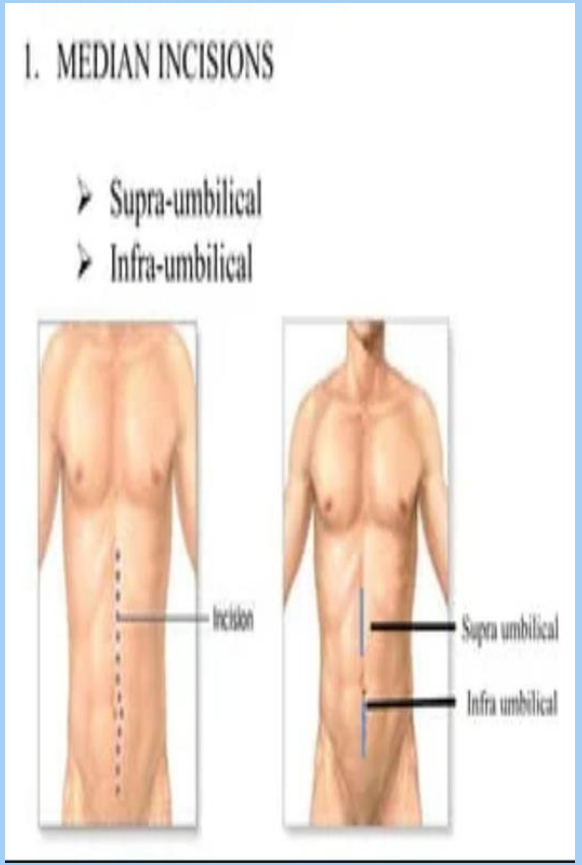
Supra and infra-umbilical incisions are used for access into the peritoneum through the tissues surrounding the umbilicus. Due to the umbilical stalk, it is unwise to incise directly through the umbilicus so the incision must route around it.

Infra-umbilical incisions may be vertical (such as when gaining access for a Hasson port) along the linea alba, which is avascular. The incision may be transverse if the surgeon is performing an open umbilical hernia repair. Supra-umbilical incisions may be used to gain access into the peritoneum or for open umbilical hernia repairs when there have been previous incisions in the infra-umbilical region.

If the transverse incision is made, then it may be used in a tight "U," or inverted "OMEGA" shape around the umbilicus to keep the future scar hidden, or it can be curvilinear to match the natural curve of the umbilical ridge.

However, one must make sure not to de-vascularize the umbilical stalk or the thin umbilical skin.

If an incision is made along the umbilical ridge, then there must be enough untouched skin on the opposing side of the incision to provide sufficient blood supply



Kocher Incisions (Subcostal)

1) An incision made inferior & parallel to the right subcostal margin to access the underlying liver and biliary tree (starting below xiphoid and extending laterally)

2)It may be mirrored on the contralateral side to provide access to the spleen or performed bilaterally.

3)Indications of the Kocher incision: gall bladder and biliary tract operation (usually open cholecystectomy).

Unlike the midline incision, it is not an avascular plane

Kocher cuts through:

1-Skin

2-subcutaneous fat and fascia

3-Lateral half: External oblique / Internal oblique / Transversis abdominis

4-Medial half: anterior rectus sheath /Rectus abdominis / posterior rectus sheath

5-Transversalis fascia*

6-Extraperitoneal fat

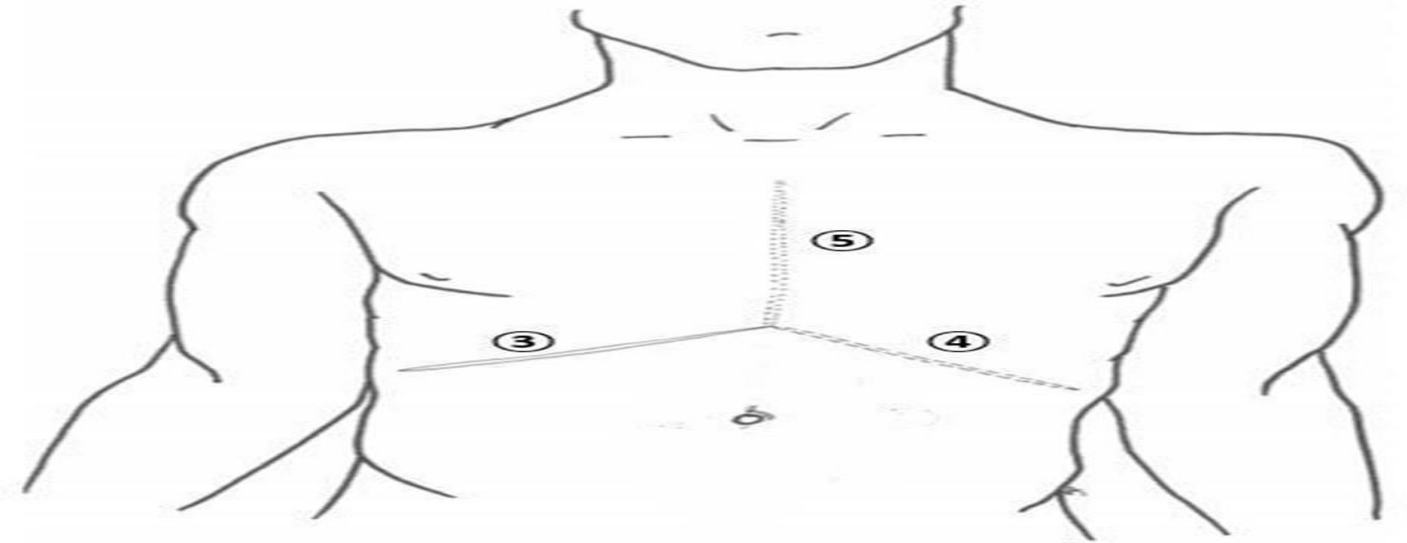
7 -peritoneum

Disadvantages include:–

1)The risk of injuring the superior epigastric vessels, and lateral extension of the incision risks disruption of intercostal nerves.

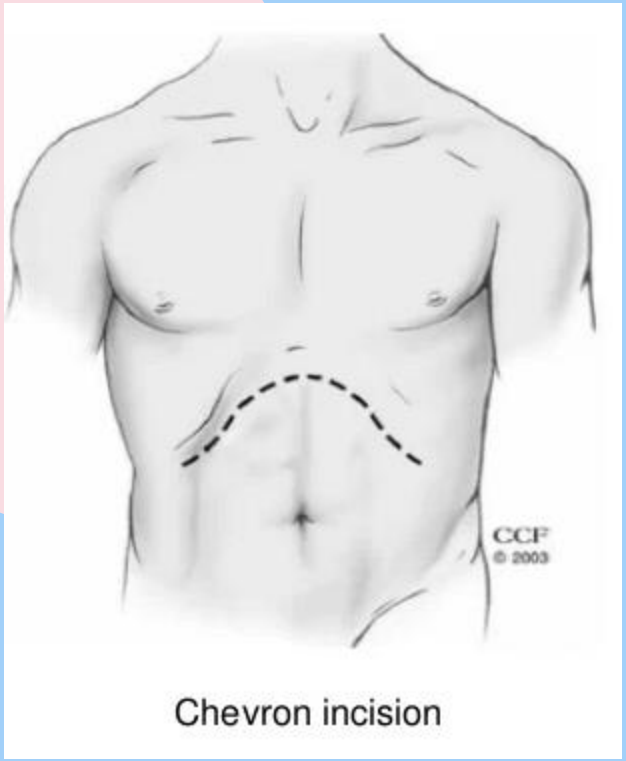
2) it is associated with a slight increase in pain during the post-operative phase due to the severing of the rectus muscle.

3)The incision closure is after the procedure in a layered fashion by suturing and approximating fascial layers



Two modifications and extensions of Kocher are possible :
1) chevron/rooftop incision: the extension of incision to the other side of the abdomen in cases of gastrectomy, hepatic resection or liver liver transplantation
2) Mercedes Benz incision: chevron incision with a vertical incision and break through the xiphisternum

Chevron



Chevron incision

The chevron incision is one that crosses the midline of the abdomen.

It is a sub-costal incision that extends from the mid to lateral costal ridge, across the midline to the contralateral side.

Uses: This approach may provide valuable exposure for hepatic, pancreatic, upper gastrointestinal region, adrenal, or renal surgeries.

Advantages:

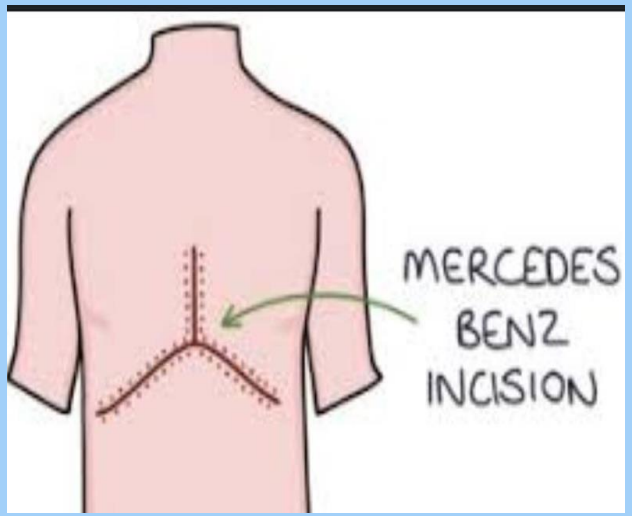
it provides access to intra- abdominal cavity + retroperitoneal space
The bilateral superior epigastric may be interrupted so , the abdominal wall will have collaterals from the perforating branches through the oblique muscles as well as the inferior epigastric meaning there will be no devascularized tissues.

Disadvantage :

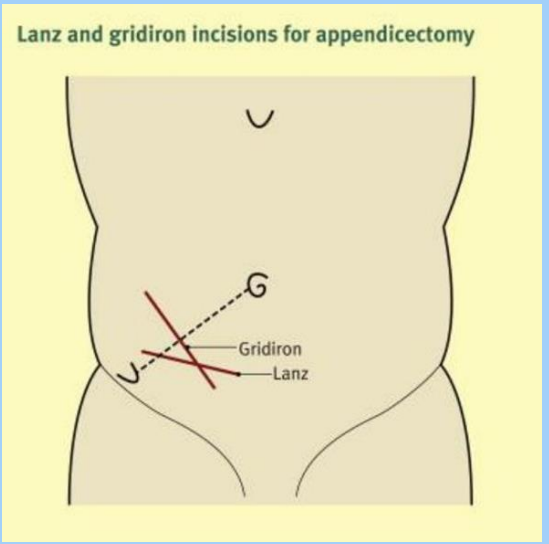
However, if there is another surgery after a chevron takes place, and the incision is through the lower abdominal wall, there may be an interruption of the inferior epigastric and middle of the abdominal wall with the least amount of collateral blood supply may ultimately be devascularized

Mercedes-Benz

This incision is a modification of the chevron incision. It is the classic chevron with a vertical incision that extends through the xiphoid and the sternum. This modification is used in liver transplants or any epigastric pathology that needs adequate exposure for debulking or total removal



Gridiron Incision (McBurney Incision)



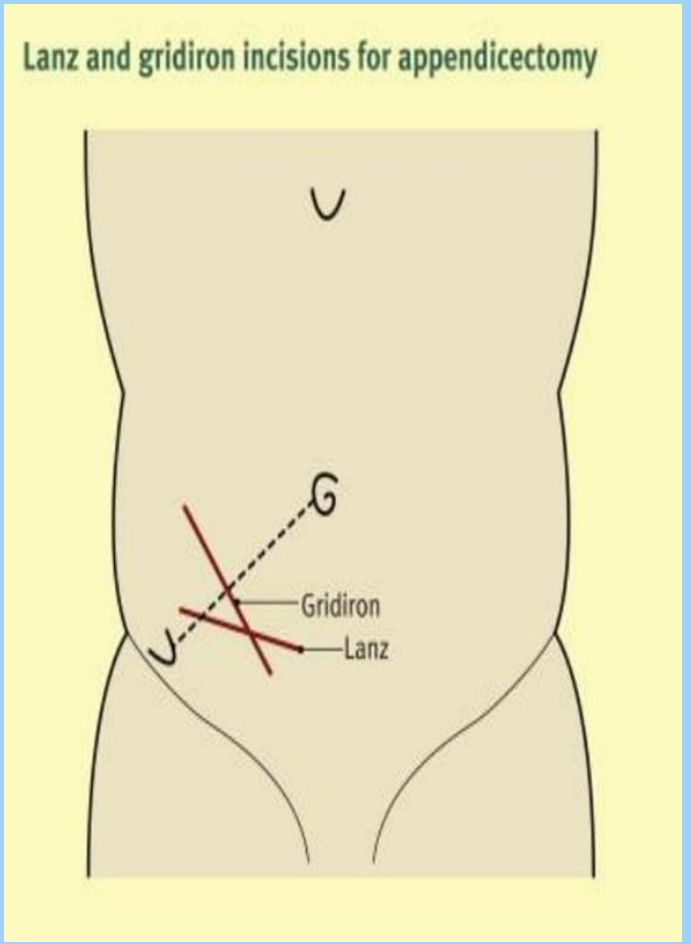
- This incision provides good exposure for performing open appendectomies and is made obliquely at the McBurney point, (two-thirds from the umbilicus to the anterior superior iliac spine) .
- an incision through the skin, subcutaneous fat and fascia, external and internal obliques, transversus abdominis and transversalis fascia

- Disadvantages include:-
- The risk of injury to the Ilioinguinal and iliohypogastric nerves.
- The superficial epigastric artery , as well as perforating branches of the inferior epigastric, may be interrupted during this incision.

- This incision may be modified to follow the horizontal Langer's lines for improved cosmesis

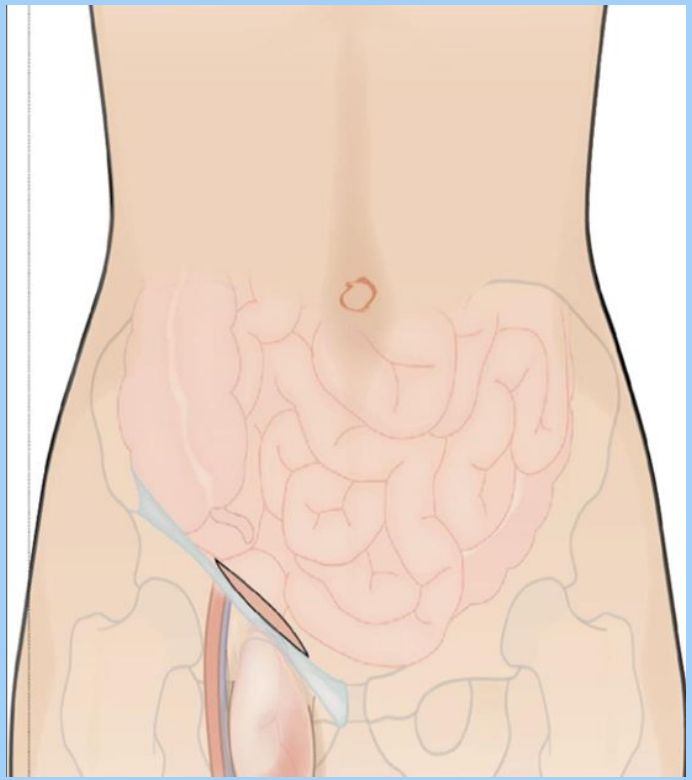
Lanz (Rockey–Davis)

- Lanz incision is similar to a gridiron incision and is useful for open appendectomies. It is made at the McBurney point with the same anatomical layers as well as the blood supply. However, the Lanz incision is a horizontal incision, while the gridiron incision is on an oblique angle.



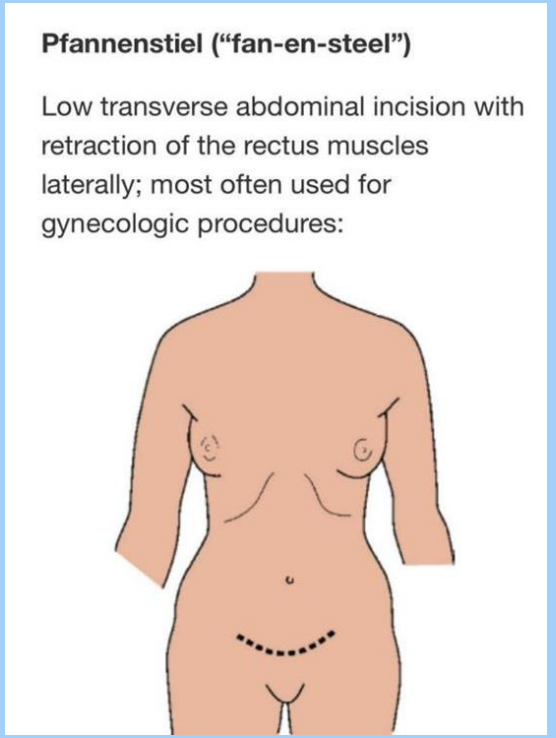
McEvedy

- The McEvedy is a vertical incision from the femoral canal and brought superior to above the inguinal ligament.
- It opens the femoral space to allow access to the femoral canal as well as the peritoneum.
- Femoral hernias may be reduced and repaired through this incision.
- If the peritoneal cavity needs to be accessed, this will provide minimal access, as the incision is not really over the peritoneal space.
- Due to the location on top of the femoral canal, special care needs to be taken not to injure the femoral vein, artery, or nerve

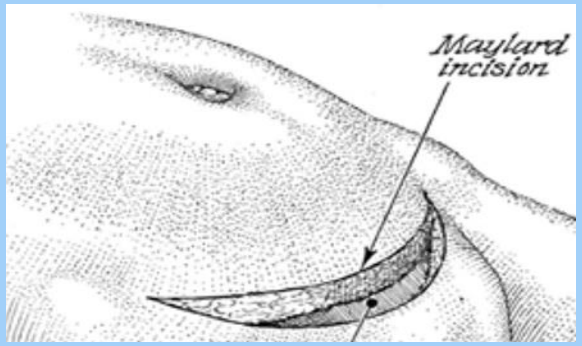


Pfannenstiel (Kerr/Pubic incision)

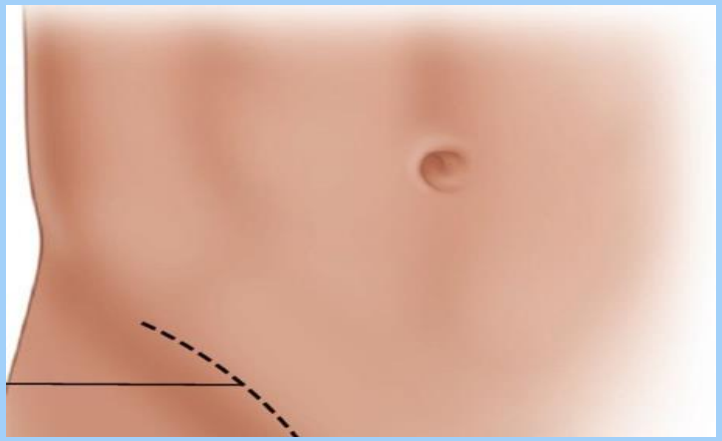
- The Pfannenstiel is a transverse lower abdominal incision that is made superior to the pubic ridge.
- Content :
- Dissection is made through the skin and subcutaneous fat; the anterior rectus sheath is divided transversely.
- The rectus muscle is open vertically in the midline sparing the muscle fibers from being divided.
- The peritoneum is then entered through a vertical incision.
- :Used in
- This approach is most frequently used for urologic, orthopedic, pelvic, and cesarean sections.
- The major drawback of this incision is its limited exposure beyond the pelvis.
- Blood supply to keep in mind is the inferior epigastric branches and the superficial epigastric



- Maylard Incision (Mackenrodt)
- A transverse incision 6cm above the pubic tubercle is made through the rectus abdominis to gain access to pelvic structures.
- The incision is made through the rectus abdominis on both sides, through the linea alba, and the medial aspects of the obliques.
- The portions of the inferior epigastric, as well as the superficial epigastric, will be damaged

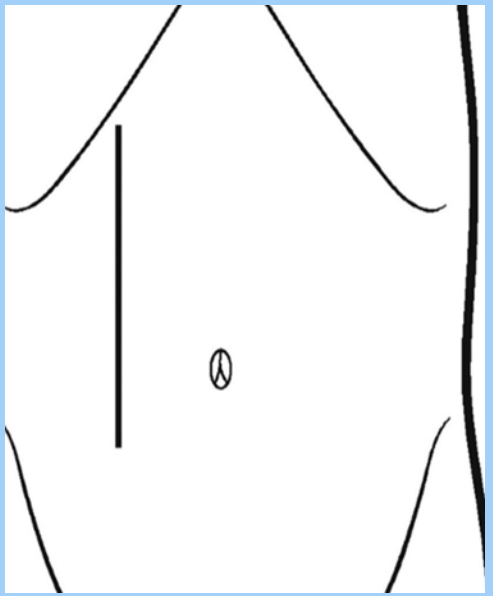


- Inguinal incision (Groin) The inguinal incision is a transverse or oblique incision over the inguinal canal. This incision is used for open inguinal hernia repairs. The incision is made through the skin to the subcutaneous fat, through Camper and Scarpa fascia. The superficial epigastric veins are commonly encountered and ligated. This incision reaches the external oblique aponeurosis and provides access to the inguinal canal



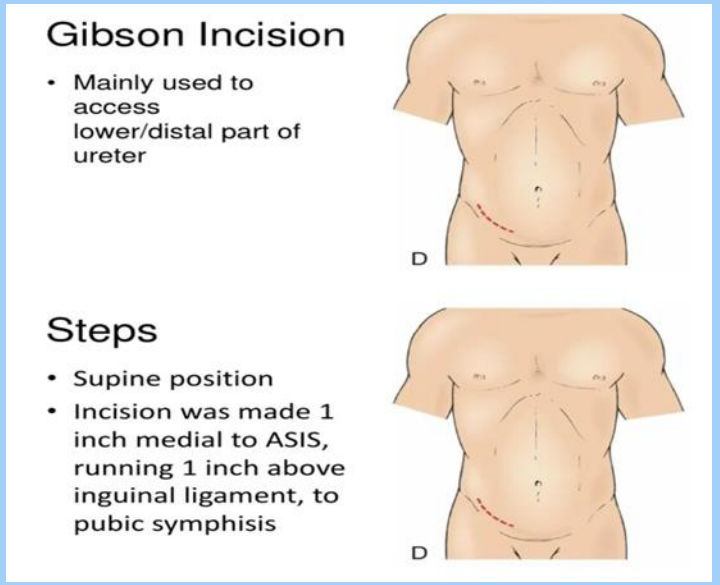
Pararectus

- A para-rectus is an incision that is made through the semilunar line laterally to the rectus abdominis muscle.
- This incision may be used for a Spigelian hernia, or if modified, can be used for an ostomy. If the incision is made circularly and the rectus abdominis is not incised but retracted, then the incision can be carried through to the peritoneum to retrieve the intestine for ostomy formation.
- How inferior or superior the incision is located will affect blood supply either from the inferior epigastric, the superior epigastric, or in the watershed zone between the two main arteries



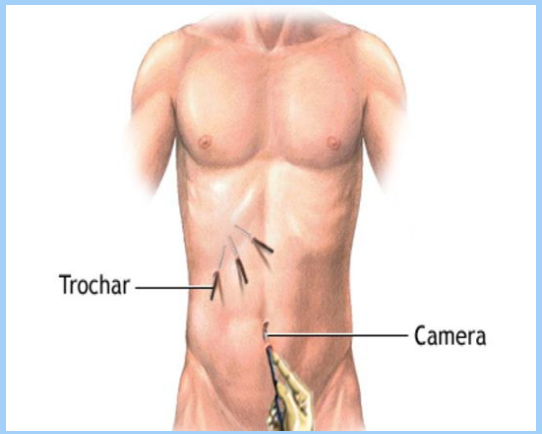
Gibson (either side but conventionally left)

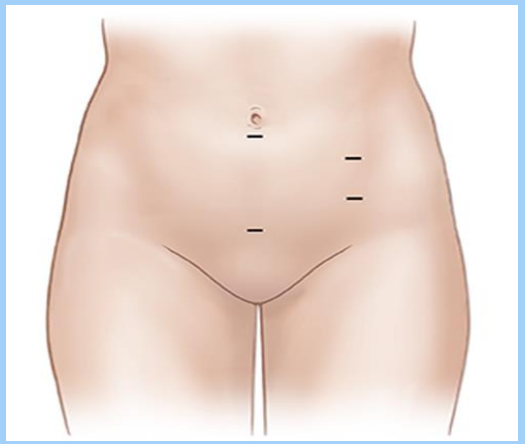
- Three centimeters above and parallel to the inguinal ligament is the Gibson incision. It is used in gynecological procedures as well as urological procedures



Laparoscopic Incisions

- Initial access is usually best achieved at the umbilicus either by using a Veress needle or the cut-down method using a Hassan troccher
- The surgeon makes a 1 cm incision (about half an inch) near the belly button for the laparoscope. Then the surgeon makes small 5 mm incisions (about a quarter inch each) in the lower corners of the abdomen. These incisions are for any other instruments that might be needed. The number and exact location of the incisions depends on which type of surgery is being performed



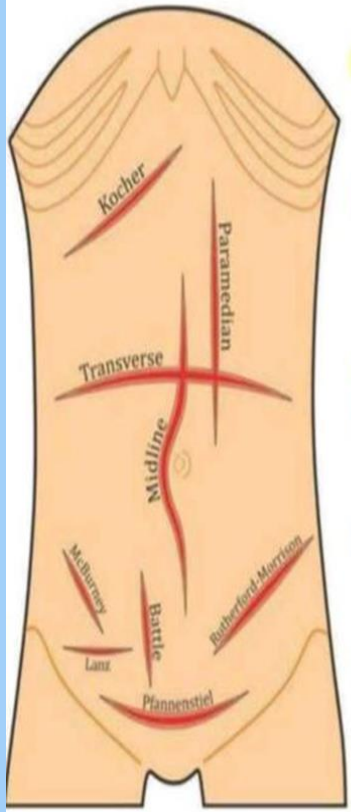


Complications of abdominal surgical incisions:

- Wound complications are important causes of early and late postoperative morbidity following laparotomy.
- -Surgical wounds in normal, healthy individuals heal through an orderly sequence of physiologic events that includes inflammation, epithelialization, fibroplasia, and maturation.
- -Mechanical failure or failure of wound healing at the surgical site can lead to disruption of the closure leading to: seroma, hematoma, wound dehiscence, or hernia. Other complications include surgical site infection and nerve injury

Incisions In Abdominal Surgery

MEDREWIND



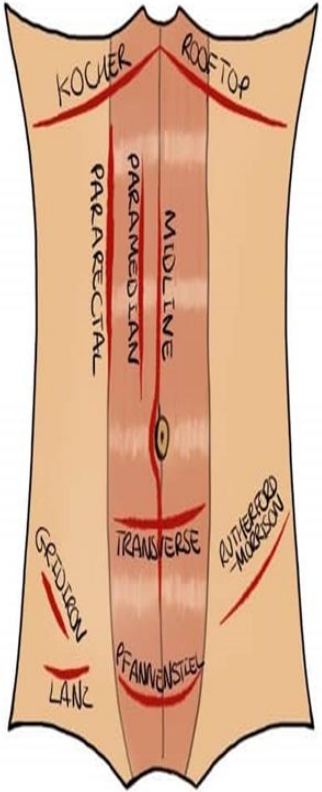
Kocher's incision – classically used for open cholecystectomy.

Midline incision – most common incision for laparotomy and also for various abdominal surgeries.

Gridiron's incision (Mc Burney's incision) – classically used for appendectomy.

Lanz incision – typically used to perform appendectomy.

Pfannenstiel incision – Incision of choice for Caesarean section and Abdominal Hysterectomy.



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