

# Approach to Abdominal Incisions

Richard Davis

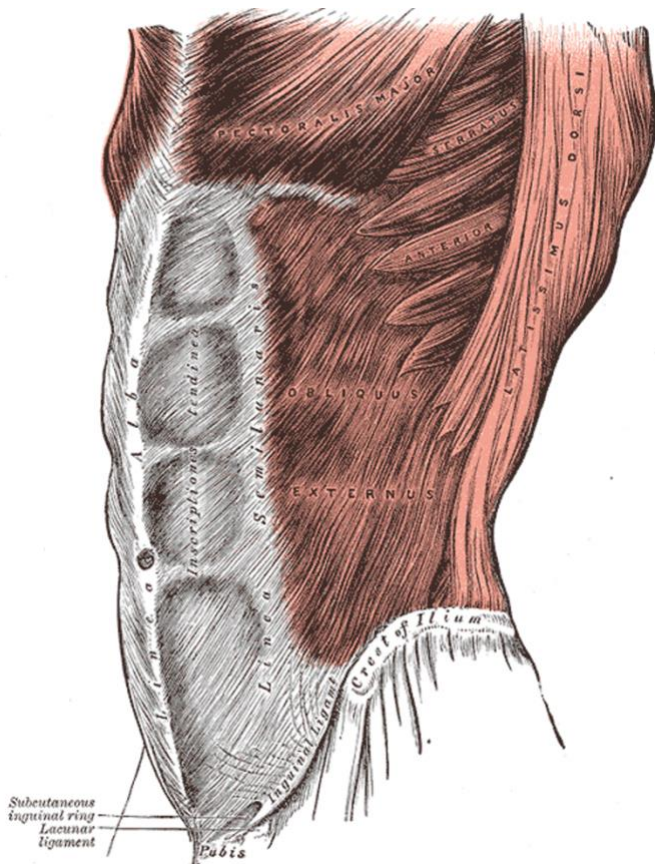
## Background:

The choice and performance of an abdominal incision will strongly affect how easy, or difficult, the operation is. The experienced surgeon, the one who seems to make everything look easy, is a master at selecting the right type of incision.

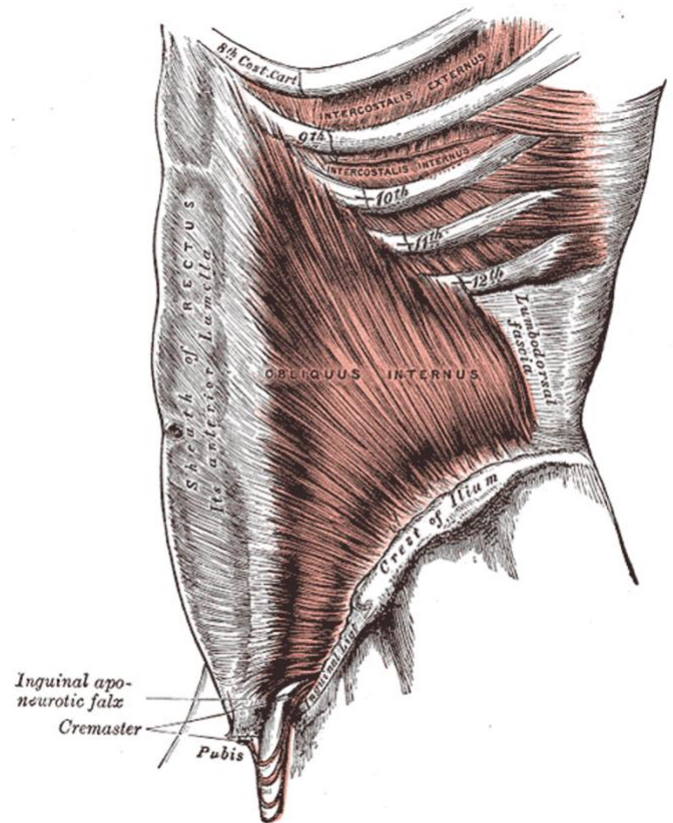
One important factor in any incision is how well it adapts to a change in plans. In this regard, the midline incision through the linea alba is the best one to use in an unknown situation. It affords access to all of the abdominal cavity, and it can be extended as much as necessary.

## Anatomy:

The lateral abdominal wall is made up of three layers of muscles. As shown below, each layer has its own orientation. This fact allows each layer to be identified, allowing safer and more purposeful opening and closing during transverse, subcostal and retroperitoneal incisions.



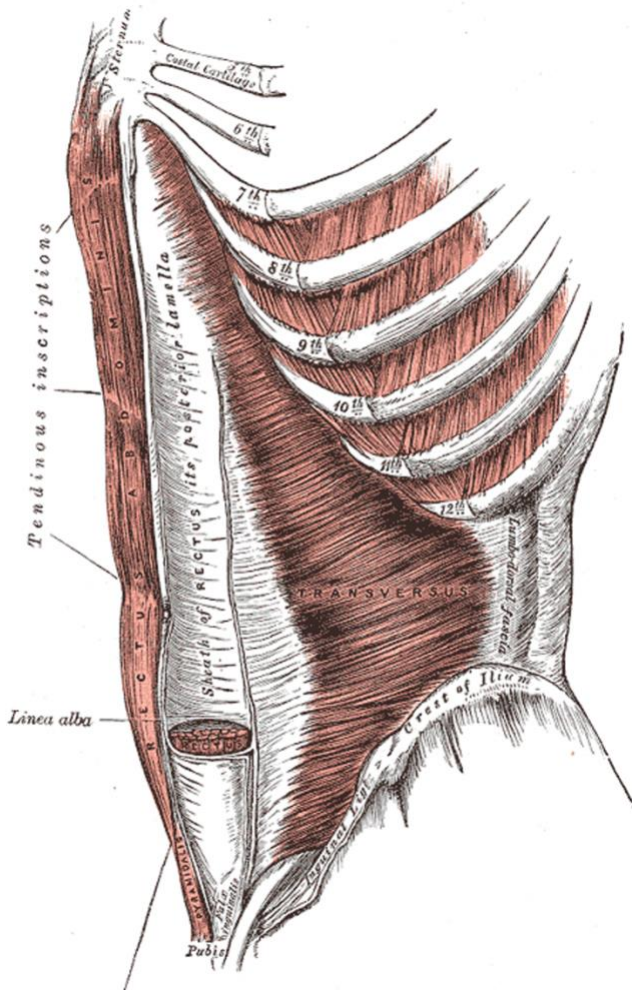
*Anterior and lateral abdominal wall, superficial. The anterior rectus sheath is continuous and meets in the midline at the linea alba. The external oblique muscle runs transversely, from superolateral to inferomedial and inserts into the lateral rectus sheath. The internal oblique muscle lies immediately beneath it.*



*Lateral abdominal wall, middle layer. The internal oblique muscle runs transversely, from inferolateral to superomedial. The transversus abdominis muscle lies directly beneath it.*

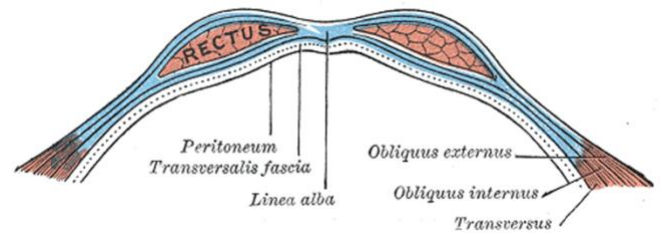
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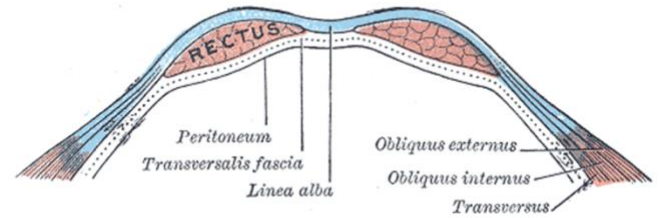


*Lateral abdominal wall, deep layer. The transversus abdominis muscle runs transversely in a horizontal orientation. The extraperitoneal space, not the peritoneum, lies directly beneath it. With care, one can transect this muscle without entering the peritoneum and then develop the plane laterally to enter into the retroperitoneum, as discussed in the chapter "Anterolateral Retroperitoneal Incision."*

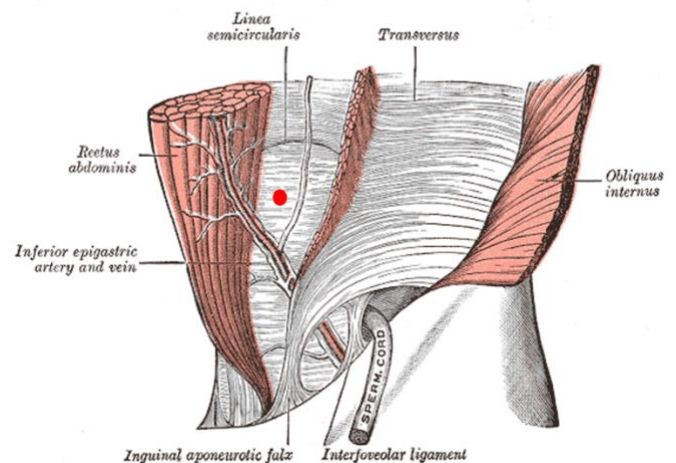
The linea alba is the name of the fascial space in between the two rectus muscles. This structure is split and then reapproximated during a midline laparotomy. Fibers of both the anterior and posterior rectus sheath contribute to the linea alba for the upper 2/3 of its length. At a point 2-3 cm below the umbilicus, the posterior rectus sheath ceases to be a fascial layer and can not be relied on to hold suture. The point where this junction occurs is called the linea semicircularis. Below this line, the fibrofatty tissue between the posterior rectus muscle and the peritoneum is called the transversalis fascia.



*Cross section of the rectus muscles and linea alba in the upper 2/3 of the abdomen. Both anterior and posterior rectus sheaths are fibrous and strong.*



*Cross section of the rectus muscles and linea alba in the lower 1/3 of the abdomen. Only the anterior rectus sheath is fibrous and strong. The space between the rectus muscle and the peritoneum is a fibrofatty layer called the transversalis fascia.*



*Disassembled view of the lower 1/3 of the rectus sheath, showing the linea semicircularis, the inferior-most extent of the fibrous part of the posterior rectus sheath. The transversalis fascia (Red dot) is not fibrous; it has no intrinsic strength and will not hold sutures for fascial closure.*

## Principles:

Unless dealing with an emergency situation, one should always assure hemostasis while making an abdominal incision. Cut vessels in the abdominal wall and preperitoneal space can continue to bleed during an entire surgery, leading to an increased total blood loss that is entirely avoidable with a little extra care. This is especially true with transverse or subcostal incisions that divide the rectus muscles; the epigastric vessels or their tributaries can retract

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within the muscle and cause troublesome bleeding. At the upper or lower abdomen these may be discrete vessels that need ligation.

While a smaller incision is certainly less painful for the patient, in the end that patient will not be served by a surgeon who can't see what is happening during the operation. You will be surprised how much difference even a few cm can make, so if you find yourself struggling with exposure or while suturing, consider extending the incision a bit. This is especially true at either end of a midline incision, where a tremendous exposure can be gained by simply dividing the recti all the way down to the pubic symphysis, or up past the xyphoid process. You may take pride in doing large operations through small incisions, but do not let your pride get in the way of what's best for the patient.

Closure of an abdominal incision is sometimes left to a junior member of the team while the surgeon goes on to more "important things." This is a mistake that the patient sometimes pays for, with an incisional hernia, wound dehiscence or visceral injury. If you have trainees, take the time to teach them the principles of proper abdominal wound closure before you leave them alone. In general, these principles include:

- Sutures through fascia, not muscle
- Layered closure, not mass closure, of the layers of the lateral abdominal wall
- Small bites with short travel, with total suture length 4 times that of the wound
- Visualization of the needle at all times. Pass the needle through each side of the fascia separately rather than both at once.
- Starting at each end of a fascial closure and meet in the middle, avoiding "sewing into a corner."

## Decision Making:

Midline incisions can be used for almost anything, including procedures that are associated with other incisions, such as Cesarean section (Pfannenstiel incision) or open cholecystectomy (subcostal incision.) Another advantage is that they can be made relatively quickly in emergency situations. Midline incisions are more useful when one does not know what will be found, such as laparotomy for trauma or bowel obstruction. Conversely, most transverse incisions are useful in

situations where specific pathology is expected, such as cholecystectomy, appendectomy, oophorectomy, or elective splenectomy.

Re-opening a previous laparotomy can be tedious if the small bowel is adherent to the incision. If you try to enter the abdomen directly through the previous incision, there is risk of injuring the adherent bowel. Instead, begin the incision beyond the scar, entering the abdomen in a previously untouched area, and then extend into the previous scar while watching or feeling for intra-abdominal incisions. This process takes time. Lysis of adhesions is described further in its own chapter.

If the patient with a previous large laparotomy presents in hemorrhagic shock and needs a laparotomy quickly, do not reopen the same incision; this will take too long. If they have a previous midline laparotomy scar, make a bilateral subcostal or transverse incision so you can quickly access the site of bleeding.

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### Resource-Rich Settings

The vast majority of intra-abdominal and retroperitoneal surgeries in Resource-Rich settings are done minimally invasively, with the laparoscope or the surgical robot. This results in less postoperative pain, faster recovery and less chance of wound dehiscence or hernia formation.

Anesthesia providers perform advanced ultrasound-guided nerve block techniques to help manage postoperative pain.

The actual act of closing the abdomen securely is not dependent on technology, but on meticulous attention to detail. There is no reason why your incisional hernia or dehiscence rate should be different from that of a surgeon in a Resource-Rich setting. Decide to learn how to close abdominal incisions safely and well.

