

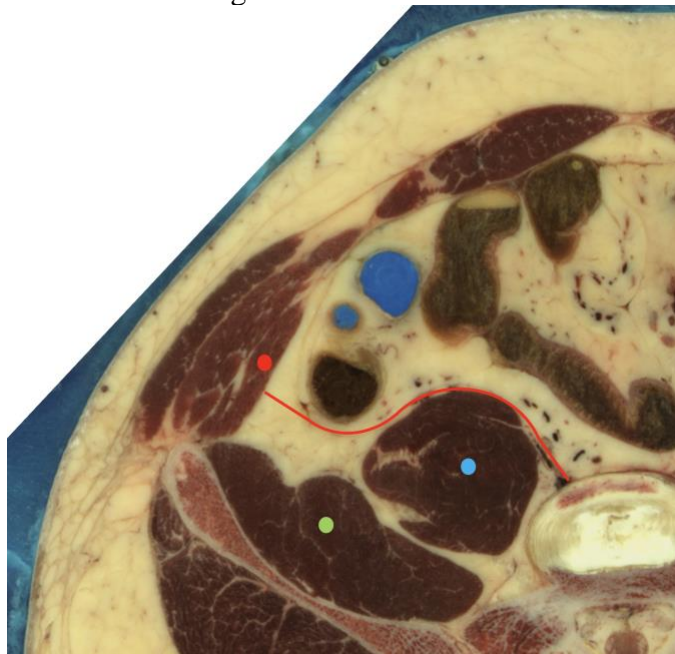
Anterolateral Retroperitoneal Incision

Richard Davis

Introduction

Accessing the retroperitoneal space with a peritoneum-sparing incision through the lateral abdominal wall muscles can make exposure much easier than a trans-peritoneal approach. The intra-abdominal contents are held back by the peritoneum itself, so retraction is much simpler. This is the approach of choice for open access to mid-ureteric stones, psoas abscesses, the iliac vessels or even (in experienced hands) the infrarenal aorta. Another well-described use of this approach is an incision above the inguinal ligament, accessing the external iliac artery without entering the abdominal cavity, to gain proximal control of a femoral artery injury in the groin. This incision is also used for kidney transplant; the kidney is placed in the lateral retroperitoneal / retropelvic space after the renal vessels are anastomosed to the iliac artery and vein, and the ureter is implanted into the bladder. This approach is sometimes called the Gibson incision.

This approach makes use of the fact that there is a distinct and non-adherent plane between the peritoneum and the internal oblique muscle. This plane can often be developed even in the presence of inflammation; the peritoneum is surprisingly tough. The key to this approach is to keep in mind the layers of the lateral abdominal wall and to be aware of which one is being divided or retracted.



Cross section of the right abdomen just above the anterior superior iliac spine shows the path of dissection after division

of the three layers of the lateral abdominal wall. The Red line follows dissection through the extraperitoneal fat below the transversus abdominis muscle (Red dot) until the peritoneum is reached. This is then retracted medially off the psoas muscle (Blue dot) allowing dissection of the plane between the peritoneum and the psoas muscle all the way to the vertebral body. The iliacus muscle (Green dot) will be at the floor of the dissection and may be seen as well. Source: National Library of Medicine Visual Human Project https://www.nlm.nih.gov/research/visible/visible_human.html

It is best to avoid entering into the inguinal canal, so the lowest this incision should be made is about 4cm above the inguinal fold. It is possible to reach deep into the pelvis including structures such as the psoas muscle, iliac arteries, bladder, and distal ureter with this incision.

Psoas abscesses will sometimes present with a fluctuant mass just medial to the anterior superior iliac spine. These are easily drained with a small skin incision. In effect, as the abscess expanded it followed in reverse the sequence of dissection described here, moving through the retroperitoneal plane and then the lateral abdominal wall muscles until it reached the skin.

The incision proceeds in the following steps:

- Transverse or oblique incision lateral to the rectus abdominis muscle
- Sharp division of the external oblique aponeurosis
- Blunt or electrocautery division of the internal oblique and transversus abdominis muscles, taking care not to enter the peritoneum.
- Dissection of the peritoneum off of the transversus abdominis muscle proceeding in a medial, then posterior direction until the pathology is reached.
- Blunt dissection with retraction, within the retroperitoneum to further expose the area to be operated.

Steps:

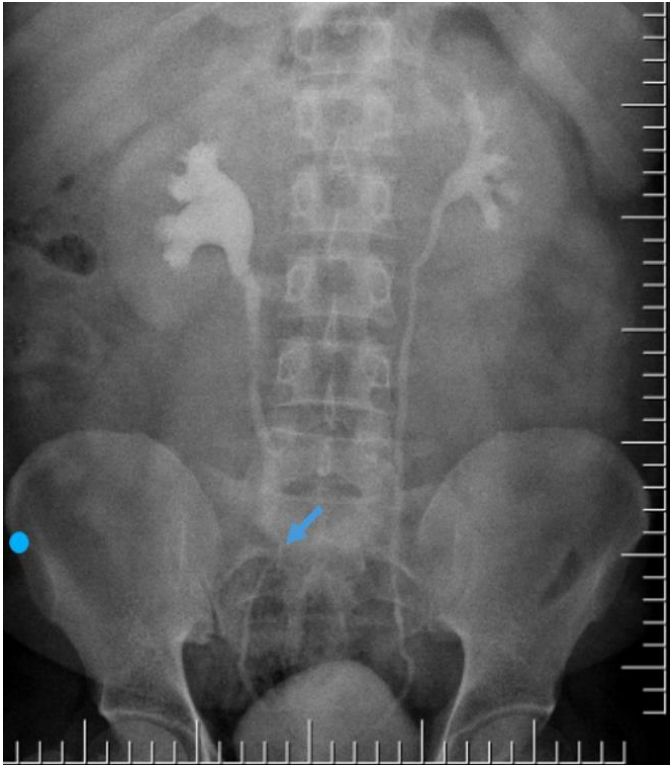
1. Decide the location of the incision, based on imaging. A CT scan is best for this: by carefully examining the axial and coronal images, the location of the incision can be chosen based on external landmarks such as the anterior superior iliac spine. Alternatively, an abdominal x-ray

Anterolateral Retroperitoneal Incision

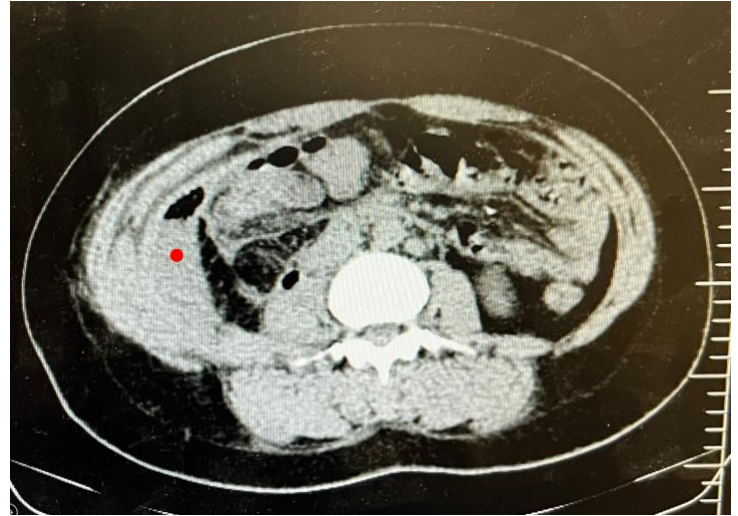
Richard Davis

that shows the location of the pathology can help you visualize its precise level.

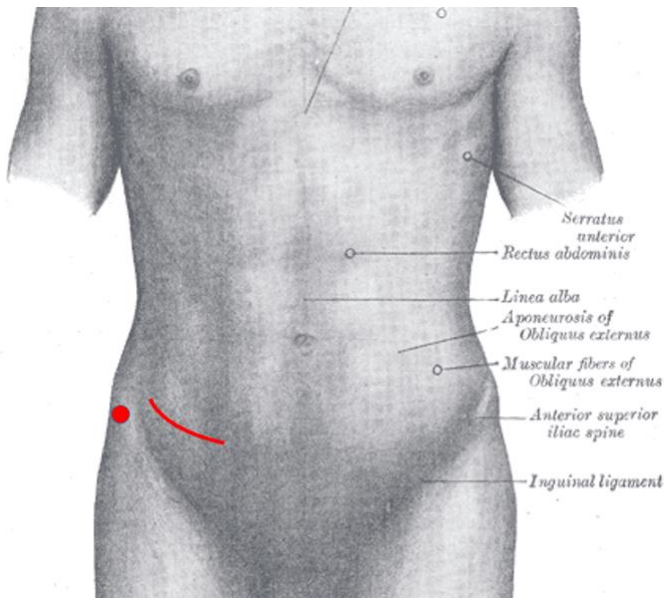
is also visible on x-ray. The incision is placed within Langer's lines for cosmesis. (For further information about ureteral stone disease see the Section on Urinary Tract Stones.)



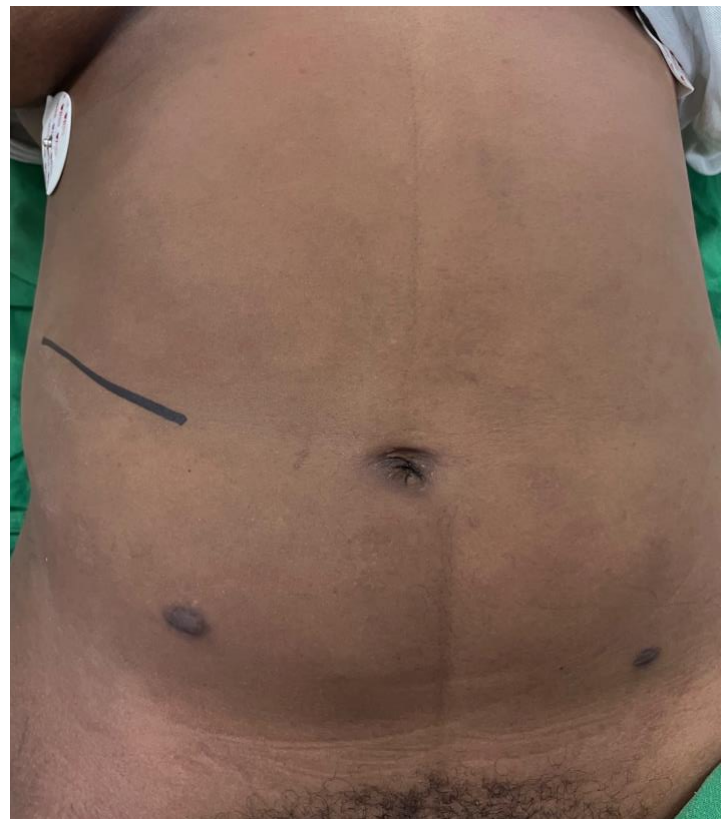
One example of a patient who would benefit from this incision. This intravenous pyelogram shows a stone impacted where the ureter crosses over the pelvic rim (Blue arrow.) To access this location, make an incision adjacent to the upper anterior superior iliac spine (Blue dot,) a palpable landmark. Case courtesy of Dr Aditya Shetty. From the case <https://radiopaedia.org/cases/27748?lang=us>



Non-contrast CT in a patient with right sided abdominal pain shows an air and fluid collection (Red dot) below the internal oblique muscle, likely in the retroperitoneal space and displacing the peritoneum medially.



Incision location for open ureterolithotomy in the patient above. The anterior superior iliac spine (Red Dot) is a palpable landmark that



For the patient above, a flank incision was planned around the level of the umbilicus.

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

www.vumc.org/global-surgical-atlas

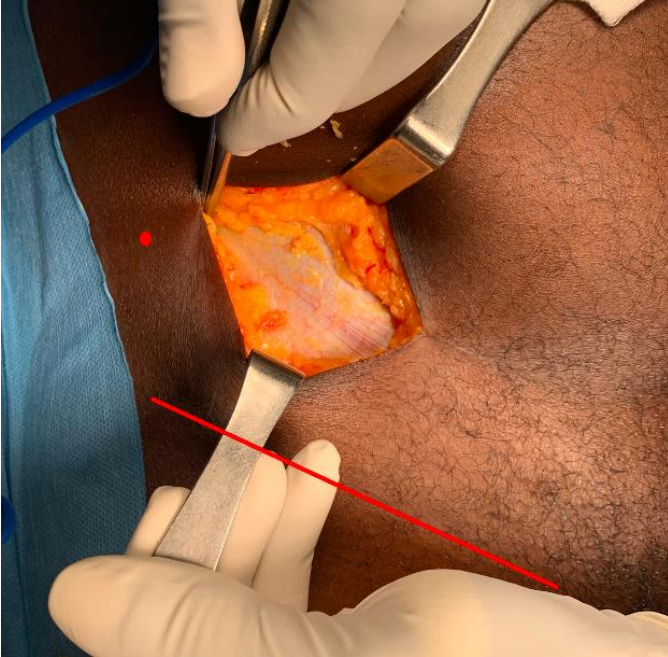
This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)



Anterolateral Retroperitoneal Incision

Richard Davis

2. After skin incision, with proper retraction, divide the external oblique aponeurosis. If the incision is at or below the anterior superior iliac spine, you may see the iliohypogastric and ilioinguinal nerves (the iliohypogastric is more cranial.) Take care to avoid injury to this structure. If the incision is not located near the inguinal canal, such precautions are not necessary as there are no nerves running deep to the external oblique aponeurosis.



After skin incision, the subcutaneous fat including Scarpa's fascia is divided and the external oblique aponeurosis is cleared. As the inguinal canal is nearby, the aponeurosis should be divided sharply with scalpel and scissors, to avoid injury to the ilioinguinal or iliohypogastric nerves. The anterior superior iliac spine is indicated by the Red dot. The inguinal fold is indicated by the Red line.



After sharp division of the external oblique aponeurosis, the internal oblique muscle, coursing from inferolateral to superomedial, is visible. The iliohypogastric nerve, covered by fibrous tissue, is visible (Blue arrow.) Injury to this structure should be avoided, both at this stage and later on in the operation.

3. Identify and separate, either bluntly or with diathermy if necessary, the fibers of the internal oblique muscle. Frequently reposition the retractors to keep the structures clear. Careful retraction, hemostasis, and attention to detail allow the surgeon to recognize each muscle layer based on their orientation: The internal oblique muscle fibers run from inferolateral to superomedial. The transversus abdominis muscles run straight transverse from medial to lateral. (This anatomy is reviewed in the chapter Approach to Abdominal Incisions.)

Anterolateral Retroperitoneal Incision

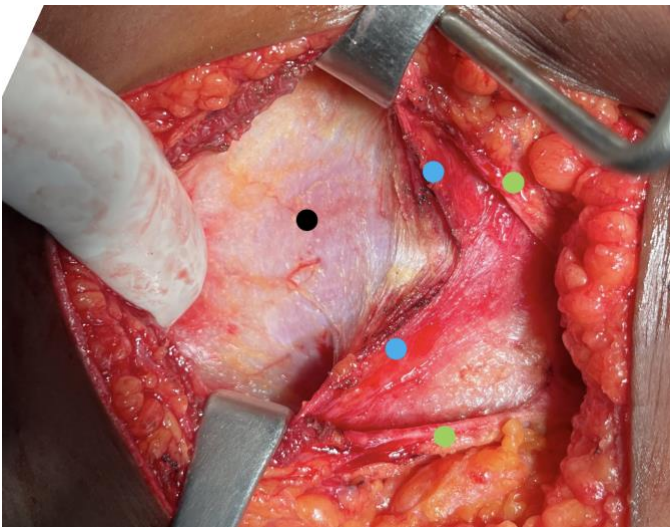
Richard Davis



The internal oblique fibers have been bluntly separated, with the iliohypogastric nerve (Blue arrow) being swept downwards. The transversely oriented fibers of the transversus abdominis muscle is visible at the base of the wound. The internal oblique muscle should be further separated laterally, either bluntly or with electrocautery, but care must be taken to avoid injury to the nerve.



The transversus abdominis muscle has been separated bluntly and the fat in the preperitoneal space is visible. Dissection will now proceed bluntly, between the fat and the transversus abdominis muscle, proceeding in the plane and direction shown by the green arrow.



For the second patient described in Step 1, the external oblique aponeurosis (Green dots) and the internal oblique muscle (Blue dots) have been divided, revealing the transversely oriented fibers of the transversus abdominis (Black dot.)

4. Insert a clamp between the fibers of the transversus abdominis and gently dissect the space posterior to it. If you can separate them bluntly, do so. Otherwise, elevate the fibers so an

assistant can divide them by diathermy. At this point the pre-peritoneal fat and possibly the peritoneum can be seen; elevate the muscle away from these structures so they are not injured while dividing the muscle. Continue the dissection until the transversus abdominis has been divided or separated for the whole length of the incision. If using diathermy, be mindful of any nerves you have previously seen and retracted.

5. Bluntly dissect the peritoneum off of the transversus abdominis laterally and posteriorly, entering the retroperitoneal space. If necessary, divide or separate the internal oblique and transversus abdominis muscles until they are separated for the entire length of the incision. A narrow malleable or narrow Deaver retractor can be helpful with this dissection. If you are at or below the level of the anterior superior iliac spine, you will be dissecting medially and posteriorly along the iliacus muscle. If you are above the level of the iliac wing, you will be dissecting along the medial aspect of the transversus abdominis.

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

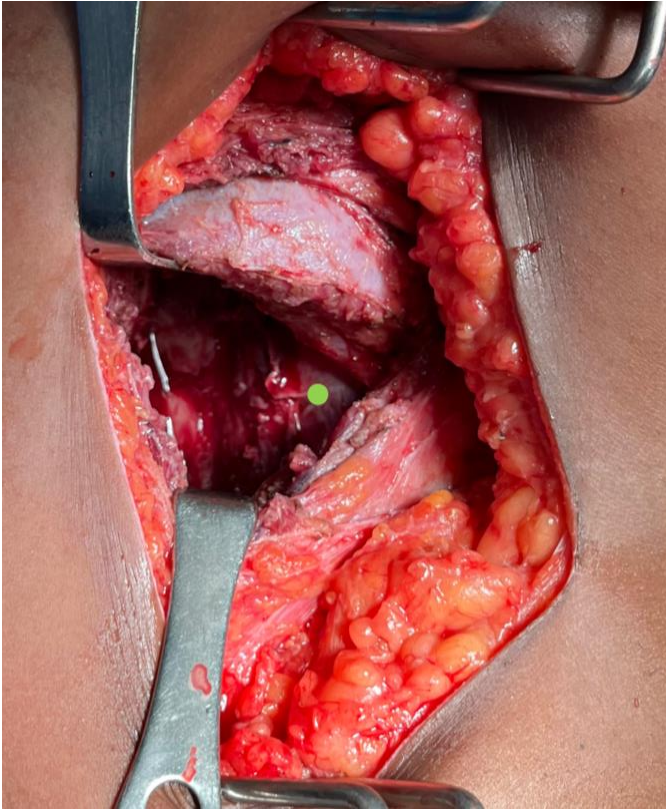
www.vumc.org/global-surgical-atlas

This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)



Anterolateral Retroperitoneal Incision

Richard Davis

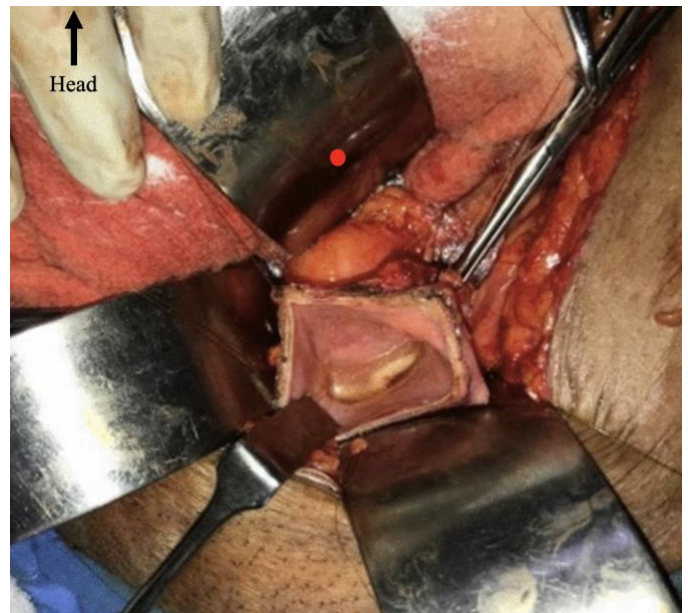


Incision for the second patient discussed in Step 1. After the transversus abdominis muscle was divided, the abscess cavity was encountered immediately below this structure. The Green dot represents the peritoneum, thickened from inflammation, displaced medially by the purulent fluid, which has been evacuated.

6. For a psoas abscess or other retroperitoneal abscess, dissection in this area may be difficult. For other conditions such as approach to the ureter or vascular access, it is easy to bluntly dissect within the retroperitoneum with proper retraction and illumination. There may be a small amount of inflammation around a ureteric stone, this will signal that you have reached the correct location.



Blunt dissection in the extraperitoneal plane towards the psoas muscle becomes increasingly more difficult until the psoas is reached. Sometimes the psoas muscle can be bluntly dissected off the peritoneum. At other times the abscess ruptures into the surgical field, as above. In either case, the abscess cavity can be entered bluntly with a fingertip and then irrigated.



Left sided extraperitoneal exploration after iatrogenic ureteral injury. The bladder (opened) and the course of the left ureter are exposed through this incision. The retractor shown by the Red dot retracts the peritoneum superomedially. Source: Shekar, P.A., Kochhar, G., Reddy, D. et al. Management of ureteric avulsion during ureteroscopy: a systematic review and our experience. Afr J Urol 26, 58 (2020). <https://doi.org/10.1186/s12301-020-00078-x>

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

www.vumc.org/global-surgical-atlas

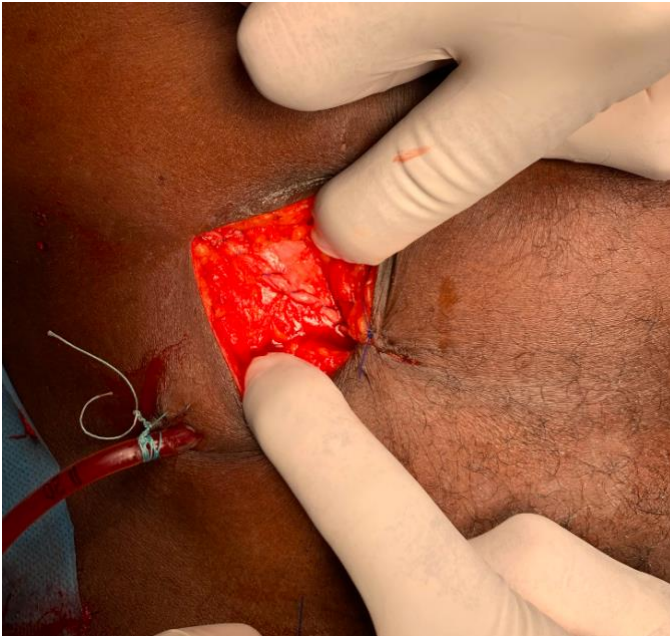
This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/4.0/)



Anterolateral Retroperitoneal Incision

Richard Davis

7. Place a drain if indicated. A Penrose drain (or cut part of a sterile glove) can be brought out through the lateral aspect of the incision and sutured to the skin. A closed suction drain can be brought out through a separate stab incision.
8. Close the external oblique aponeurosis with absorbable suture, taking care not to entrap any nerves underneath it. If excessive diathermy division of the internal oblique or transversus abdominis muscles was performed, these can be reapproximated, also taking care not to entrap any nerves in the closure.



Closure of the external oblique aponeurosis followed by skin closure. If a Penrose drain is used, the lateral portion of the wound can be left open to allow passage of the drain.

Pitfalls:

- Placing the incision in the wrong location. If you find that you are slightly too high or too low, you can increase visibility by extending your incision laterally, through the lateral abdominal wall muscles, and dissecting the retroperitoneum off of the transversus abdominis muscle further.
- Inadequate hemostasis during the approach will make visualization of the tissue planes very difficult; take your time and use diathermy,

suction, and a sponge to keep the plane clean and dry.

- Inadequate lighting will make it difficult to work: this approach inevitably creates a deep hole. Position the overhead lights before surgery keeping in mind where this hole will be. Wear a headlight if you have one.
- Severe inflammation in the retroperitoneum, as in a psoas abscess or other perforated viscus or tumor, will make this dissection very difficult. When draining a psoas abscess by this approach, it is rarely possible to dissect around the psoas muscle; inevitably the abscess is entered during the approach to the muscle.
- Inadvertent entry into the peritoneal cavity is not a problem. A small hole in the peritoneum does not need to be closed, either during or at the end of the surgery. If the hole is large enough that it allows bowel to enter and block your view, close the peritoneum with a running absorbable suture.

Richard Davis, MD FACS FCS(ECSA)
AIC Kijabe Hospital
Kenya

May 2022