Ultrasound – Abdominal Wall Evaluation

PURPOSE:
To evaluate abdominal wall for muscular and soft tissue abnormalities, including hernias, soft tissue masses, fluid collections, and other focal or palpable abnormalities.

ORDERABLES:

US ABDOMINAL WALL OR LOWER BACK SOFT TISSUES

SCOPE:
Applies to all ultrasound studies performed for the evaluation of abdominal or inguinal hernias in:

- UT Southwestern University Hospitals and Clinics, Imaging Services (UTSW)
- Parkland Health and Hospital System, Department of Radiology (PHHS)

INDICATIONS:

- Signs (example: mass) or symptoms (examples: pain, fullness) associated with hernia or other focal mass
- Assess for superficial fluid collection / drainable abscess
- Abnormal findings on other imaging studies
- Follow up known hernia

CONTRAINDICATIONS:

- No absolute contraindications

EQUIPMENT:

- Linear array transducers with a frequency range of 10-18 MHz and large field of view (5 cm).
- Linear, sector, or curvilinear transducers with a frequency range of 1-9 MHz may be required for appropriate penetration and resolution depending on patient's body habitus.

PATIENT PREPARATION:

- None

EXAMINATION:

GENERAL GUIDELINES:

A complete examination includes evaluation of the region corresponding to the patient's signs or symptoms.

EXAM INITIATION:

- Review any prior imaging, making note of associated abnormalities requiring evaluation.
- Introduce yourself to the patient/family
- Verify patient identity using patient name and DOB
- Explain test
- Obtain patient history including symptoms. Enter and store data page
- Place patient in supine and/or standing position

TECHNICAL CONSIDERATIONS:

- Images should generally be taken with and without Valsalva maneuver, with proper annotation, particularly for suspected hernias.

- Images may be taken standing, with proper annotation, if abnormality not well demonstrated supine, and/or if patient states symptoms are worse with standing.
- Hernias:
  - Hernia sac and hernia neck should be documented with size measurements.
  - Contents of the hernia sac (bowel, fluid, etc) should be evaluated. For instance, detection of bowel gas and peristalsis indicate a bowel-containing hernia.
  - Evaluate for reducibility, tenderness, and change in overlying skin color (erythema).
  - Fat/omental herniation may appear indistinct from the surrounding subcutaneous fat. Higher frequency transducer and movement of fat during or immediately following Valsalva can help discern the two.
  - Anterior abdominal wall hernias typically occur at midline, around the periumbilical region, and along the lateral margin of the rectus abdominis muscle, the oblique muscle superolaterally, and the IEA inferomedially. See Appendix
  - Incisional hernias can occur deep to a skin scar.
- Rectus Diastasis
  - Rectus diastasis is the widening of the space between the two rectus muscles of the anterior abdominal wall.
  - Leads to stretching and thinning of the central fibrous band (linea alba).
  - Superimposed abdominal wall laxity may lead to outward bulging (eventration) without hernia (no peritoneal defect or hernia sac).
- Focal Abnormalities:
  - Use of color, Power and microDoppler techniques help distinguish vascular from non-vascular tissue.
  - Focal abnormalities should be measured in three planes, preferably in dual-screen.
  - Panoramic images help document abnormalities larger than the transducer's field-of-view.
  - Including images of the contralateral normal abdominal wall soft tissues helps delineate abnormalities / asymmetry.
  - For fluid collections, stationary cine loop to showing mobile debris may be useful.
  - Compressibility of an abnormality is often useful.

DOCUMENTATION:

Focal Abnormalities

- Grayscale images
  - Longitudinal images:
    - Representative images of the palpable or sonographic abnormality
    - Transverse images:
    - Representative images of the palpable or sonographic abnormality
    - Panorama images:
      - LONG and TRV, if area is larger than a single field of view, or if comparison to regional anatomy or other soft tissues is needed
  - Comparison Images
    - Comparison to contralateral soft tissues (for asymmetric abnormalities off midline)
  - Measurements
    - Dual-screen, LONG and TRV (if able to fit in one image)
  - Cine images:

    - Cine sweep, transverse (superior to inferior) and long of entire region (use trapezoid/wide view if needed)
    - Dynamic images during Valsalva, if needed, with annotations
    - Dynamic images with compression, with annotations
  - Without and with color, power, and microDoppler

Assessment for rectus diastasis

- Requires panoramas across abdominal wall, sequentially from sub-xyphoid to pubis, every 2 cm or so
- Measure distance between rectus muscles (the linea alba… if > 1-2 cm, this is rectus diastasis)
- If there is outward outpouching of the linea alba, this is called eventration (not strictly hernia, unless there is a superimposed peritoneal defect)
- Evaluate area(s) of greatest separation without and with Valsalva, with annotations

Assessment of abdominal wall hernias

- Longitudinal and Transverse images:
  - Representative images of the palpable or sonographic abnormality
  - Measurement of sac
  - Without/with Valsalva
  - Measurements of neck of peritoneal defect at widest dimensions
  - Measurements of sac size
  - Note if hernia is sub-umbilical (immediate deep to), or periumbilical (above, below, or off to the side)
  - Document any bowel gas or peristalsis within sac
- Cine loops
  - With Valsalva and relaxation, with annotations
  - Of mobile debris, if present
  - Of peristalsis, if seen
- Panoramic images if hernia does not fit within a single field-of-view
- Repeat imaging standing, if abnormality not well seen supine, and/or if patient states abnormality is worse with standing

PROCESSING:

- Review examination images and data
- Export all images to PACS
- Document relevant history and any study limitations

REFERENCES:

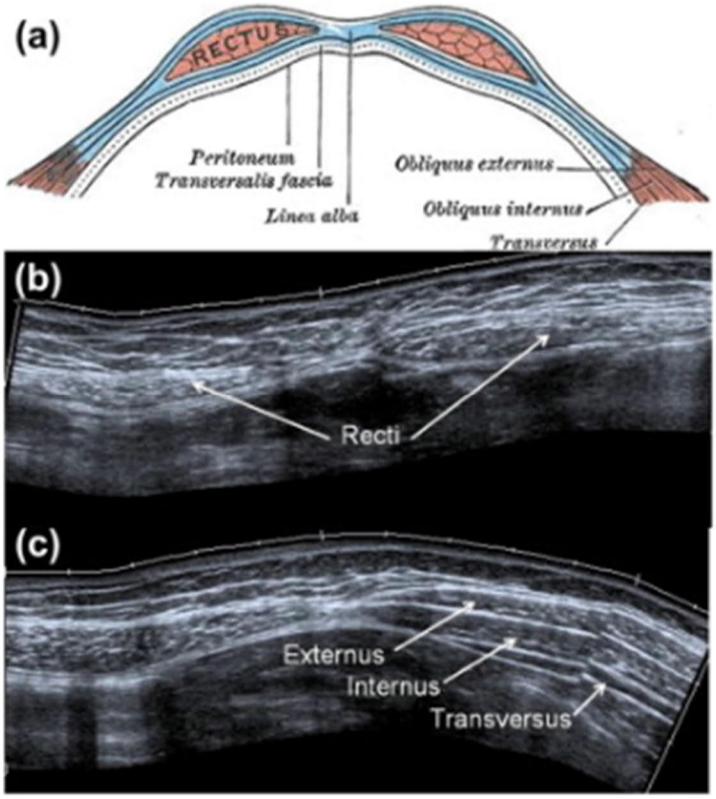
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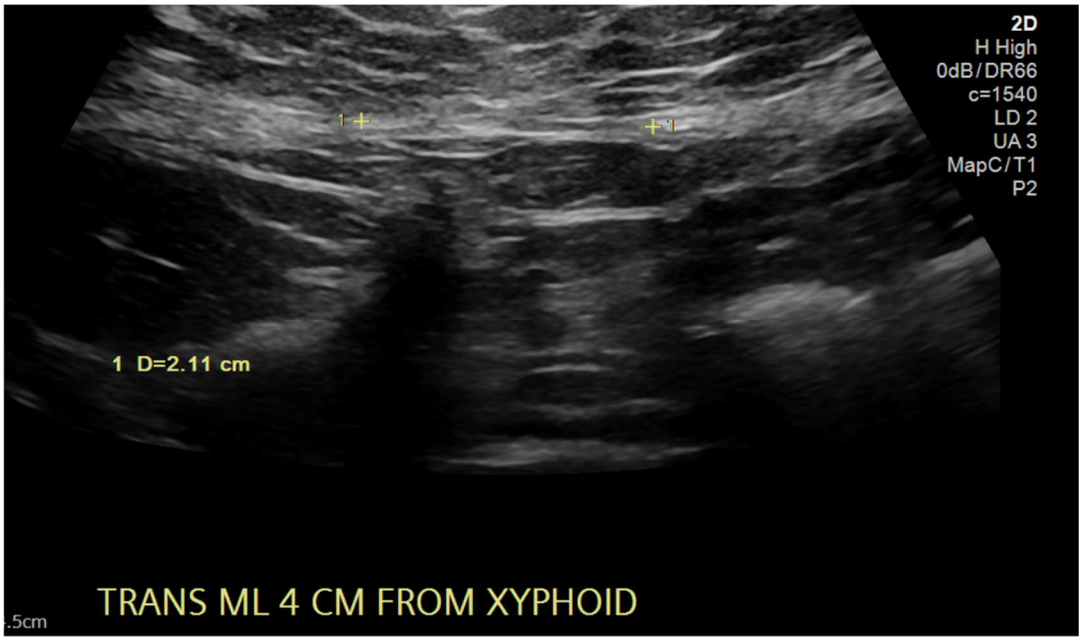
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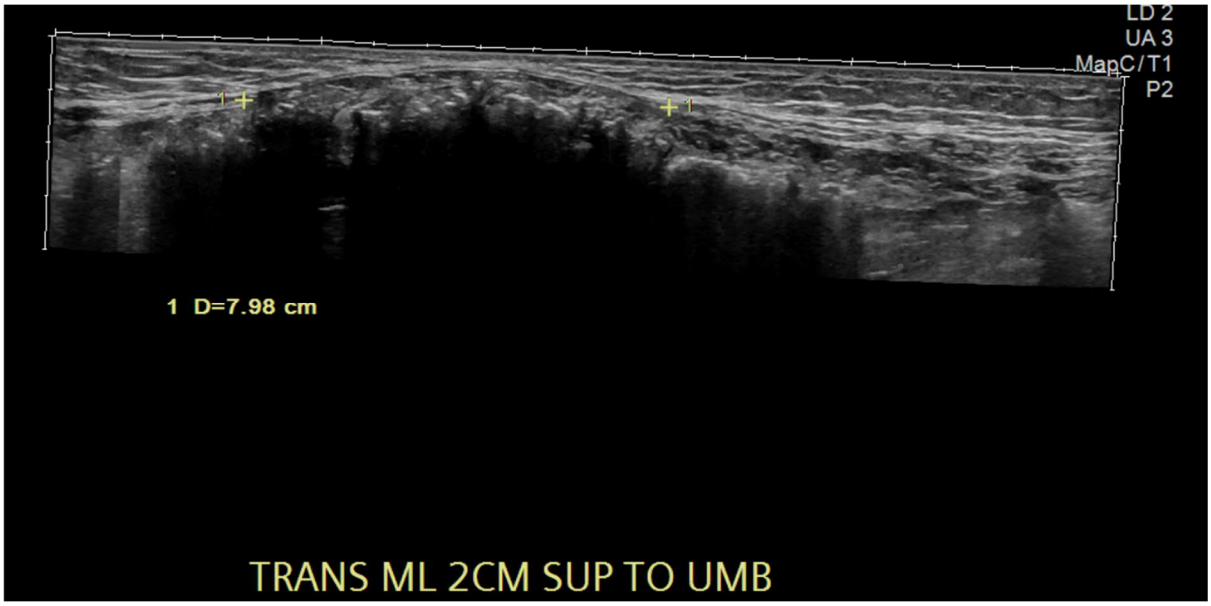
STATUS	NAME & TITLE	DATE	BRIEF SUMMARY
Submission	Alyssa Harmon	10/10/2022	Submitted
Approval			Approved
Review			Reviewed
Revisions	David Fetzer, MD	8/19/2025	Optional techniques added, language clarified
	Hilary Allen, BS, AAS, RDMS, RVT	8/11/2025	Additional images and diagram added
	David Fetzer, MD	9/9/25	Approved

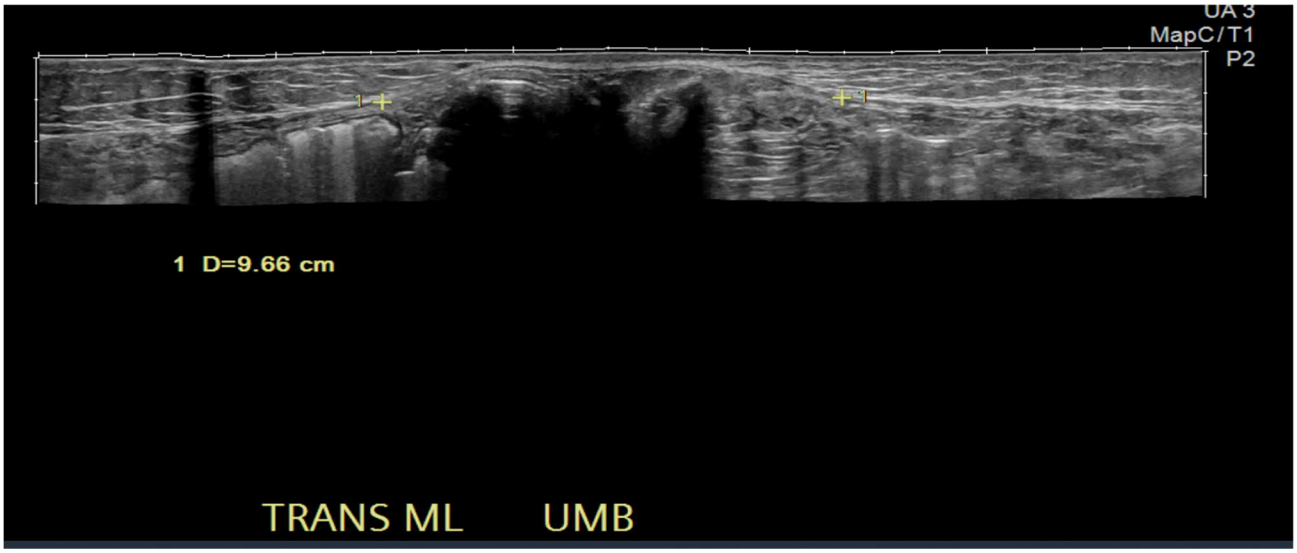
APPENDIX:

Rectus Diastasis

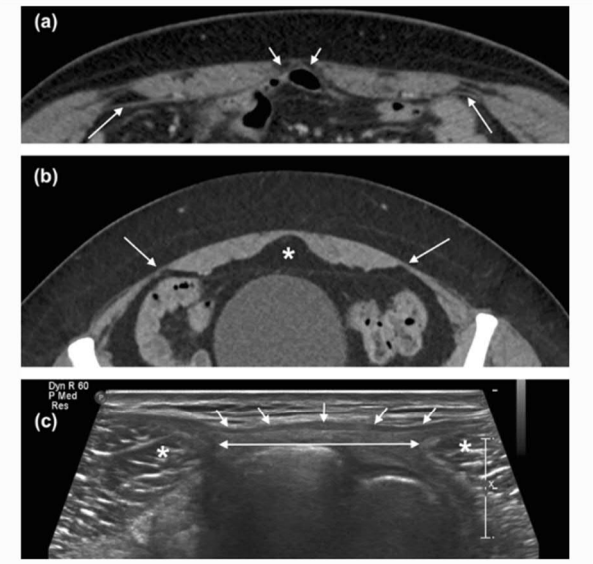




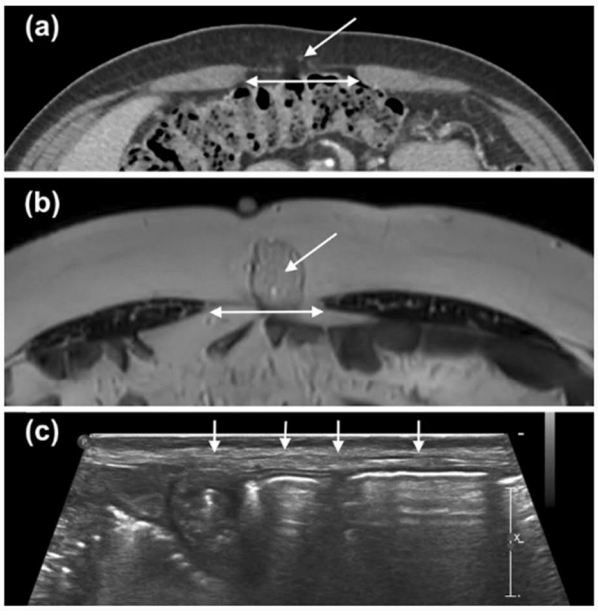




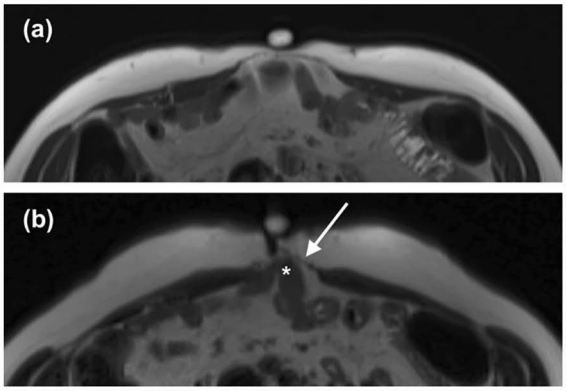
Diastasis recti with mild eventration in the absence of focal defect or hernia.



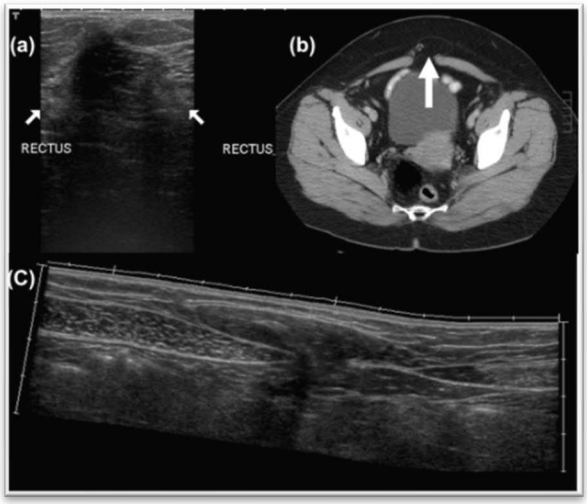
Normal anatomy of the anterior abdominal wall on CT above the level of the arcuate line (**a**), with clear depiction of the anterior component of the rectus sheath from the external oblique, the posterior component from the transversus abdominis (long arrow), and the internal oblique aponeurosis contributing to both the anterior and posterior sheath. Note the medial fat deposition of the rectus muscles close to the linea alba, which is a normal variant (short arrows). The corresponding CT below the level of the arcuate line (**b**) shows the lateral strap muscle aponeurosis anterior to the rectus muscle bellies (long arrows) and only the transversalis fascia and peritoneal lining forming the posterior sheath, with preperitoneal fat (asterisk) between the two. On ultrasound (**c**), diastasis recti in a 35 year old primiparous woman is well depicted, with the linea alba forming a well-defined low echo structure (short arrows) between the rectus muscle bellies (asterisks). The inter-rectus distance (IRD) is shown by the double-headed arrow



CT (**a**) and MR (**b**) clearly depict co-existent herniation of pre-peritoneal fat (arrows) in conjunction with rectus diastasis (double headed arrows). Where there is a clear linea alba defect and fat protrusion, the diagnosis is straightforward. Conversely, where the linea alba is simply markedly attenuated and "threadbare" (ultrasound image, **c**; compare with the normal linea alba in Fig. 2c) it may be challenging to determine if the small defects (arrows in 5c) denote true hernias of preperitoneal fat or not



Straining MR performed at rest (**a**) and during attempted transversus abdominis muscle engagement exercise (**b**) shows a considerable reduction in IRD with muscle contraction, and corresponding corrugation of the linea alba (arrow in 3b). There is minor anterior protrusion of a bowel loop (asterisk in 3b) without herniation. The small high signal nodule above the skin surface is a cod liver oil capsule that has been taped to the patient to mark the area of interest



Hernia

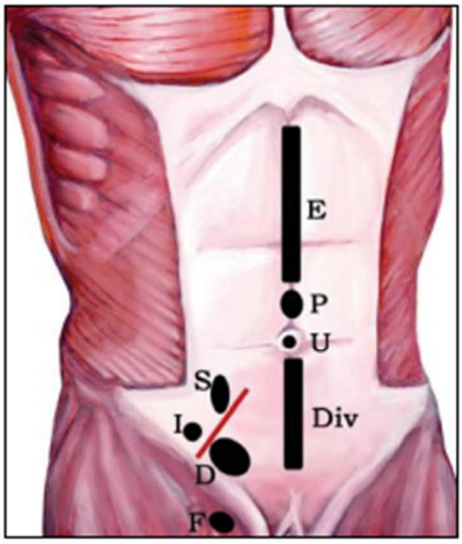


Fig. 1—Illustration of anterior abdominal wall shows usual anatomic location of various anterior abdominal wall hernias. Red line in right lower quadrant indicates inferior epigastric artery. E = epigastric hernia; P = periumbilical hernia; U = umbilical hernia; Div = infraumbilical divarication of the rectus abdominis muscles, which may be seen along entire extent of linea alba; S = spigelian hernia; I = indirect inguinal hernia; D = direct inguinal hernia; F = femoral hernia.

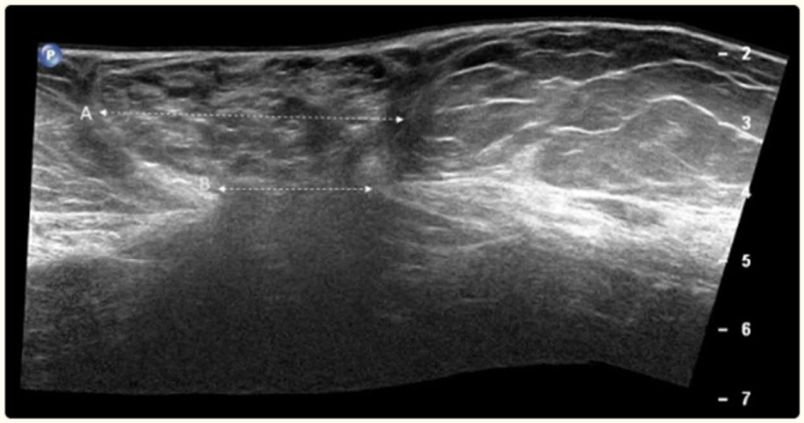


Fig. 6

Umbilical hernia. Ultrasonography shows omental fat (A: caliper) through a defect (B: caliper) in the linea alba


MSK Deep
eL18-4
48Hz
RS
2D
63%
Dyn R 68
P Med
Gen
TIS0.1
MI 0.6
M3
X3
W/VALSALVA
Trans MIDLINE @AOC SUP TO UMBILICUS
7.1cm
*** bpm


Dist 1.70 cm
Trans MIDLINE @AOC SUP TO UMB



Periumbilical hernia containing predominantly omental fat

SPIGELIAN HERNIAS: Anterior abdominal wall hernia that occurs along the lateral margin of the rectus abdominis muscle, the oblique muscle superolateraly, and the IEA inferomedially.

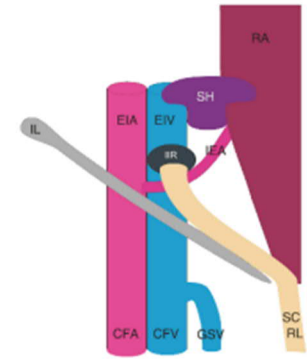


FIGURE 31. Illustration showing the relationship of a spigelian hernia (SH) to the surrounding anatomy. Almost all spigelian hernias arise from the inferior end of the spigelian fascia just lateral to where it is penetrated by the inferior epigastric vessels just lateral to the lateral edge of the rectus abdominis muscle. Although these are usually considered anterior abdominal wall rather than groin hernias, the neck of spigelian hernias often lies within 2 cm of the internal inguinal ring (IIR), where indirect inguinal hernias arise. CFA indicates common femoral artery; CFV, common femoral vein; EIA, external iliac artery; EIV, external iliac vein; GSV, greater saphenous vein; IEA, inferior epigastric artery; IL, inguinal ligament; RA, rectus abdominis muscle; SC/RL, spermatic cord or round ligament.

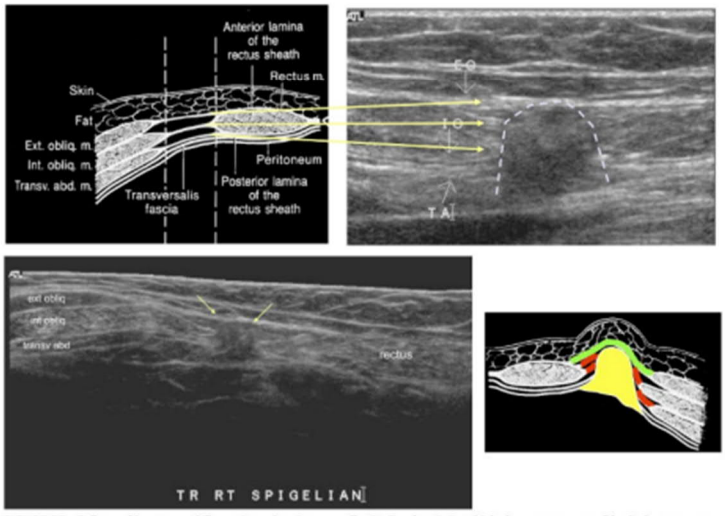


FIGURE 32. Collage of images and illustrations showing a small spigelian hernia in which the aponeuroses of both the transverse abdominis (TA) and the internal oblique (IO) muscles are torn, but in which the external oblique (EO) aponeurosis, as usual, is intact. This is the most common pattern of aponeurosis defects in spigelian hernias. Drawing adapted from Skandalakis.