

Ultrasound – US Groin Evaluation

PURPOSE:

To evaluate groin and/or inguinal region for hernia, lymphadenopathy, or other mass.

ORDERABLES:

US Groin

- Select **Right, Left** or **Bilateral** when ending exam

SCOPE:

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

- UT Southwestern William P. Clements Jr. University Hospital, Zale-Lipshy Pavilion, and all University Hospital-based 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
- Abnormal findings on other imaging studies
- Follow up known hernia

CONTRAINDICATIONS:

- No absolute contraindications

EQUIPMENT:

- Linear array transducers with a frequency range of 10-12 MHz and large field of view (5 cm).
- Linear, sector, or curvilinear transducers with a frequency range of 2-9 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:

- 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:

- Review any prior imaging, making note of associated abnormalities requiring evaluation.
- Images should be taken with and without Valsalva maneuver, with proper annotation.
- **Hernias:**
 - For suspected hernias, images should be taken supine and standing, with proper annotation.
 - Hernia sac and hernia neck should be documented with size measurements.

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- Contents of the hernia sac (bowel, fluid, etc) should be evaluated. For instance, detection of bowel gas and peristalsis indicate a bowel-containing hernia.
- Evaluated for reducibility, tenderness, and change in overlying skin color (erythema).
- Fat/omental herniation may appear indistinct from surrounding subcutaneous fat. Higher frequency transducer and movement of fat during Valsalva can differentiate.
- To distinguish between indirect, direct, and femoral hernias and identify the inferior epigastric artery (IEA) within the anterior abdominal wall, tracing it inferiorly to the origin from the external iliac artery (see Appendix).
- Hernias anterior to the external iliac vein (EIV) and superolateral to the IEA are referred to as Indirect Inguinal Hernias (IIH), and descend into the scrotum through the inguinal canal. These hernias are located anterior to the spermatic cord. See Appendix.
- Hernias anterior to the EIV and inferomedially to the IEA are referred to as Direct Inguinal Hernias (DIH). Direct hernias are located posterior to the spermatic cord. See Appendix.
- Hernias located inferior to the inguinal crease, medial to the common femoral vein (CFV), are likely in the femoral canal. These hernias are more common in females and located in the anterior thigh. See Appendix.
- **Other abnormalities:**
 - Document any abnormal appearing lymph nodes, fluid collections
 - Measure collections, masses, and abnormal lymph nodes in 3 planes
 - Obtain images without and with color Doppler/microDoppler (MFI; MVI; etc).
 - If pseudoaneurysm is suspected or seen, change order to US Pseudoaneurysm with correct images from the protocol.

DOCUMENTATION:

- **Longitudinal images:**
 - Representative images, without and with measurements included if abnormal
 - Images without and with color Doppler/microDoppler (MFI; MVI; etc).
 - For inguinal hernias:
 - Measure neck
 - Repeat in standing position
- **Transverse images:**
 - Representative images without and with measurements included if abnormal
 - Images without and with color Doppler/microDoppler (MFI; MVI; etc).
 - For inguinal hernias:
 - Identify sac relative to inferior epigastric artery near origin with the external iliac artery. This is to distinguish direct (medial to inferior epigastric) from indirect (lateral) inguinal hernias.
 - Identify sac relative to common femoral artery and vein (femoral hernias are anterior to these vessels).
 - Measure neck
 - Repeat imaging in standing position
- **Cine images:**
 - Dynamic images in TRV and LONG during Valsalva and relaxation
 - Stationary cine loop to document peristalsis of bowel, if seen

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- For abnormalities larger than the transducer field-of-view, obtain panorama images in at least one plane.

PROCESSING:

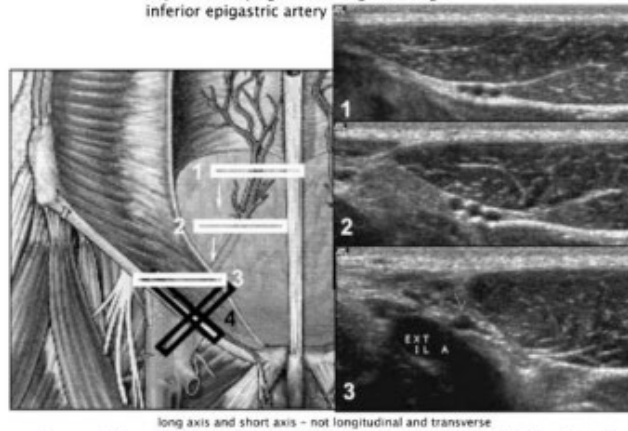
- Review examination images and data
- Export all images to PACS
- Document relevant history and any study limitations

REFERENCES:

- ACR-AIUM Practice Guideline (Revised 2007)
- Stavros AT et al. Dynamic Ultrasound of Hernias of the Groin and Anterior Abdominal Wall.
- Ultrasound Quarterly 2010;26:135-169.

APPENDIX:

key to identifying internal inguinal ring =
inferior epigastric artery



long axis and short axis – not longitudinal and transverse

FIGURE 9. Diagram and images of the main landmark for evaluating the inguinal area, the inferior epigastric vessels (IEVs). Image 1 is obtained in a transverse plane about half-way between the umbilicus and the pubic symphysis. The inferior epigastric artery and its paired veins lie along the midlateral posterior surface of the rectus abdominis muscle. Image 2 is obtained several centimeters inferiorly, and the IEVs lie more laterally. Image 3 is obtained at a level where the IEVs (arrow) lie at the edge of the rectus muscle. (This is the level at which most spigelian hernias occur.) Image 4 shows that once the origin of the inferior epigastric artery, the transducer should be rotated into planes that are parallel and perpendicular to the inguinal canal—long-axis and short-axis views.

INDIRECT INGUINAL HERNIA (most common): hernias anterior to the external iliac vein (EIV) and superolateral to the IEA are referred to as Indirect Inguinal Hernias (IIH), and descend into the scrotum through the inguinal canal. These hernias are located anterior to the spermatic cord.

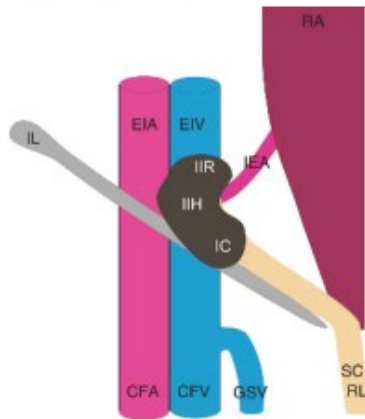


FIGURE 11. This diagram shows the relationship of indirect inguinal hernias (IH) to the inferior epigastric artery (IEA) origin from the external iliac artery (EIA). The neck of the hernia arises in the internal inguinal ring (IIR), extends anteriorly, then extends inferomedially superficial to the proximal to the IEA and lies anterior to the spermatic cord (SC) in males or round ligament (RL) in females. Other landmarks: CFA indicates common femoral artery; CFV, common femoral vein; EIA, external iliac artery; EIV, external iliac vein; GSV, greater saphenous vein; IC, inguinal canal; IL, inguinal ligament; RA, rectus abdominis.

DIRECT INGUINAL HERNIAS: Hernias anterior to the EIV and inferomedially to the IEA are referred to as Direct Inguinal Hernias (DIH). Direct hernias are located posterior to the spermatic cord.

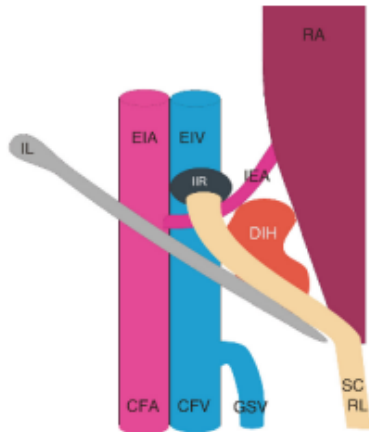


FIGURE 21. Diagram showing the relationship of a direct inguinal hernia (DIH) to the surrounding anatomy. The neck of the hernia arises in the area of the conjoined tendon and lies inferior and medial to the proximal inferior epigastric artery (IEA). The hernia sac does not pass superficial to the IEA and lies posterior and medial to the spermatic cord (SC) or round ligament (RL). CFA indicates common femoral artery; CFV, common femoral vein; EIA, external iliac artery; EIV, external iliac vein; GSV, greater saphenous vein; IIR, internal inguinal ring; IL, inguinal ligament; RA, rectus abdominis muscle; SC/RL, spermatic cord/round ligament.

FEMORAL HERNIAS: Hernias located inferior to the inguinal crease, medial to the common femoral vein (CFV), are likely in the femoral canal. These hernias are more common in females and located in the anterior thigh.

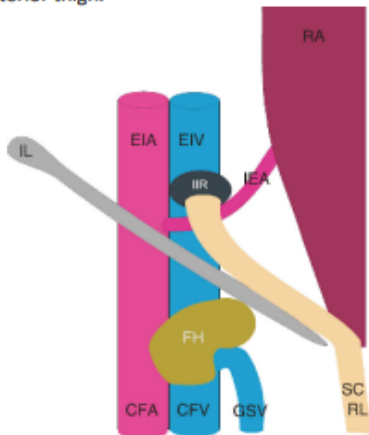


FIGURE 26. Illustration showing the relationship of a femoral hernia (FH) to the surrounding anatomy. Femoral hernias arise within the femoral canal, which lies medial to the common femoral vein just superior to the saphenofemoral junction and inferior to the inguinal ligament. Small femoral hernias remain medial to the CFV, but larger hernias usually wrap around anterior to the CFV. 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; IIR, internal inguinal ring; IL, inguinal ligament; RA, rectus abdominis muscle; SC/RL, spermatic cord or round ligament.

CHANGE HISTORY:

STATUS	NAME & TITLE	DATE	BRIEF SUMMARY
Submission	Alyssa Harmon	10/10/2022	Submitted
Approval	David Fetzer, MD	11/4/2022	Approved
Review	Amber Lachowicz	11/4/2022	Reviewed
	Laura Reynolds	11/4/2022	
Revisions			