

Ultrasound – Evaluation for Penile Abnormalities

PURPOSE:

To evaluate corpora for normal blood flow and for rupture, identify a retained foreign body, or characterize other focal abnormalities or collections of the penis and surrounding soft tissues.

SCOPE:

Applies to all penile ultrasound studies performed in:

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

INDICATIONS:

- History, clinical signs (examples: ecchymosis, swelling), or symptoms (example; pain) associated with penile trauma; penile pain, priapism, evaluation for Peyronie's disease
- Abnormal findings on other imaging studies

CONTRAINDICATIONS:

- No absolute contraindications.
- Erectile Dysfunction (E.D.) – A complete assessment typically requires intra-cavernosal prostaglandin injection, which is not directly offered in Radiology (requires review/approval from faculty).

In some cases, such as after trauma or in young patients, penile Doppler for E.D. may be performed in Radiology to confirm blood flow in the cavernosal arteries, and to evaluate for vascular anomaly/malformation (e.g. High flow versus low flow priapism).

- In rare cases, patient may self-inject, or injection may be provided with the assistance of Urology provider.

EQUIPMENT:

High-frequency linear array transducer with a frequency range of at least 7-18 MHz

PATIENT PREPARATION:

- None

EXAMINATION:

GENERAL GUIDELINES:

A complete examination includes evaluation of the entirety of the penile shaft, penile base, glans penis, both corpora cavernosa and central arteries, and corpora spongiosum.

A chaperone is required for female sonographers, though should be made available for all sonographers regardless of gender, and/or when requested by the patient. Chaperone may be of any gender with the patient's consent. Chaperone's name should be documented in Tech Notes and the Electronic Health Record.

EXAM INITIATION:

- Introduce yourself to the patient and 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 position with a towel covering the scrotum. For imaging of the dorsal penile surface, the penis should be orientated toward the feet, placed over the towel. For imaging of the ventral surface, the penis should be oriented toward the head, positioned on the abdomen over a towel.

TECHNICAL CONSIDERATIONS:

- Review any prior imaging, making note of associated abnormalities requiring evaluation.
- The ventral penis is the anterior surface when the penis is erect. The dorsal penis is the surface positioned posteriorly (toward the abdomen) when the penis is erect. When the penis is directed inferiorly, the dorsal surface faces anteriorly.
- The paired corpora cavernosa, along the dorsal penis, constitute the erectile tissue of the penis and extend from the penile base to the glans penis (tip) on either side.
- The cavernosal arteries are located centrally within each corpus cavernosum. Use low-flow Doppler parameters as needed.
- The single corpus spongiosum, along the ventral penis, contains the penile urethra and distally expands to form the glans penis.
- Grayscale and cine images should be annotated with the position of the penis and the surface being imaged.
- **Ruling out Penile Fracture.**
 - Evaluate corpora for disruption as denoted by discontinuity of echogenic ring of tunica at periphery of corpora.
 - Location of any penile hematoma may indicate an underlying area of fracture.
 - Key images are gray-scale images in area of hematoma/tunical disruption.
 - Longitudinal color and spectral Doppler images of cavernosal arteries required to charge for US Penile Doppler (don't typically help in diagnosis).
- **Evaluating for Peyronie's disease.**
 - Evaluate corpora cavernosa for regions of peripheral tunical thickening, echogenic and often calcified plaques. Most commonly seen dorsally at base of penis.
 - Key images are transverse and gray-scale images of any tunical plaques with size and location.
 - Strain elastography, or linear-transducer shear wave elastography, may help identify areas of increased, asymmetric tunical stiffness.
 - Longitudinal color and spectral Doppler images of cavernosal arteries required to charge for US Penile Doppler (don't help in diagnosis).
- **Evaluating Priapism.**
 - Most cases not evaluated with ultrasound. Urologist obtains blood gas from corpus cavernosum.
 - Our job would be to differentiate if priapism is low-flow (most cases) or high flow.
 - Key images are color Doppler images of corpora using low-flow settings. Low flow priapism will have little if any flow in the corpora. High flow priapism is from a traumatic injury and will demonstrate a focal region of high flow in the corpus cavernosum due to an arteriovenous fistula, with corresponding low-resistance arterial waveforms in the corresponding cavernosal artery, and increased flow in the draining vein.

- Longitudinal color and spectral Doppler images of cavernosal arteries and draining vein needed.
- **Evaluating Penile swelling.**
 - Diffuse swelling often infectious/inflammatory.
 - Key images are gray-scale and color Doppler. Longitudinal color and spectral Doppler images of cavernosal arteries required to charge for US Penile Doppler.
 - **Balanitis** – inflammation of foreskin/glans penis. Grayscale and color Doppler show thickening and hyperemia of foreskin and glans penis. Evaluate for any abscess.
 - **Penile Abscess** – rare, can be due to fistula from perianal region. Grayscale and color Doppler images of any fluid collections or any fistula tracts extending to scrotum/perineum. Evaluate corpora for any internal abscess. Make note of any soft tissue gas.
 - **Penile mass** – penile cancer usually at glans penis or involving foreskin. Evaluate area of any palpable mass. Grayscale and color Doppler images of any mass. If mass dorsal, evaluate superficial dorsal vein for thrombosis. Not involvement of tunica and underlying corpora (cavernosa and/or spongiosum).

DOCUMENTATION:

- Ventral penis
 - Transverse images:
 - Proximal without and with color Doppler
 - Mid without and with color Doppler
 - Distal, near glans penis without and with color Doppler
 - Glans
 - Cine sweep images of each corpus cavernosum, base to glans
 - Longitudinal images:
 - Right corpus cavernosum with and without color Doppler
 - Midline/corpus spongiosum with and without color Doppler
 - Left corpus cavernosum with and without color Doppler
 - Cine sweep images of each corpus cavernosum
 - May need multiple (e.g. Sweep at base; sweep at mid/distal shaft)
- Dorsal penis
 - Transverse images:
 - Penile base without and with color Doppler
 - Proximal without and with color Doppler
 - Mid without and with color Doppler
 - Distal, near glans penis without and with color Doppler
 - Glans without and with color Doppler
 - Cine sweep images of each corpus cavernosum, base to glans
 - Longitudinal images:
 - Right corpus cavernosum with and without color Doppler
 - Midline/corpus spongiosum with and without color Doppler
 - Left corpus cavernosum with and without color Doppler
 - Right cavernosal artery, prox, mid and distal, with color Doppler and spectral Doppler
 - Left cavernosal artery, prox, mid and distal, with color Doppler and spectral Doppler
 - Midline superficial dorsal vein
 - Cine sweep images of each corpus cavernosum
- Measure any hematoma or other collection, mass, or any plaque visualized
- Data page(s)

PROCESSING:

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

UT Southwestern Department of Radiology

Anatomy	Gray Scale Still	Color Doppler	Waveform	PSV	Cine
Ventral Penis					
Trans Ventral Penis Prox	x	x			
Trans Ventral Penis Mid	x	x			
Trans Ventral Penis Distal (near Glans)	x	x			
Trans Ventral Penis Glans	x	x			
Trans Ventral Penis Corpus Cavernosum Base to Glans midline					x
Trans Ventral Penis Corpus Cavernosum Base to Glans Rt					x
Trans Ventral Penis Corpus Cavernosum Base to Glans Lt					x
Long Ventral Penis Rt Corpus Cavernosum	x	x			
Long Ventral Penis ML Corpus Spongiosum	x	x			
Long Ventral Penis Lt Corpus Cavernosum	x	x			
Long Ventral Penis Corpus Cavernosum Rt*					x*
Long Ventral Penis Corpus Cavernosum Lt*					x*
Dorsal Penis					
Trans Dorsal Penis Base	x	x			
Trans Dorsal Penis Prox	x	x			
Trans Dorsal Penis Mid	x	x			
Trans Dorsal Penis Distal (near Glans)	x	x			
Trans Dorsal Penis Glans	x	x			
Trans Dorsal Penis Corpus Cavernosum Base to Glans midline					x
Trans Dorsal Penis Corpus Cavernosum Base to Glans Rt					x
Trans Dorsal Penis Corpus Cavernosum Base to Glans Lt					x
Long Dorsal Penis Rt Corpus Cavernosum	x	x			
Long Dorsal Penis ML Corpus Spongiosum	x	x			
Long Dorsal Penis Lt Corpus Cavernosum	x	x			
Long Dorsal Penis Corpus Cavernosum Rt*					x*
Long Dorsal Penis Corpus Cavernosum Lt*					x*
Long Dorsal Penis Rt Cavernosal Artery Prox		x	x	x	
Long Dorsal Penis Rt Cavernosal Artery Mid		x	x	x	
Long Dorsal Penis Rt Cavernosal Artery Distal		x	x	x	
Long Dorsal Penis Lt Cavernosal Artery Prox		x	x	x	
Long Dorsal Penis Lt Cavernosal Artery Mid		x	x	x	
Long Dorsal Penis Lt Cavernosal Artery Distal		x	x	x	
Long Dorsal Penis ML Superficial Dorsal Vein		x	x	x	
*May require multiple cine sweeps at base, mid, distal shaft					
**Additional images for hematoma, other collection, mass, or plaque may be needed					

REFERENCES:

J Ultrasound Med 2005; 24:993–1000

Penile Doppler Ultrasound for Erectile Dysfunction: Technique and Interpretation. AJR 2019

REVISION HISTORY:

SUBMITTED BY:	David T. Fetzer, MD	Title	Medical Director
APPROVED BY:	David T. Fetzer, MD	Title	Medical Director
APPROVAL DATE:	11-09-2015		
REVIEW DATE(S):	09-24-2018		Jeffrey Pruitt, MD
REVISION DATE(S):	11-15-2015	Brief Summary	
REVISION DATE(S):	09-24-2018; Pruitt	Brief Summary	Changed exam title from Penile Trauma to Penile Abnormalities; Added additional indications for exam; added cavernosal artery evaluation info; added info on tunical plaques
	02-10-2020	Brief Summary	Updated indications/contraindications; added illustrations; updated image order
	09-30-2024		Routine review. Updated for clarity and consistency

APPENDIX:





