Ultrasound – Renal Doppler Complete (Patency Check)

PURPOSE:
This targeted evaluation is tailored for the main renal arteries and veins of the native kidneys to assess for vessel patency.

SCOPE:
Applies to all ultrasound abdominal studies performed in Imaging Services / Radiology

EPIC ORDERABLE:
- US Doppler Kidney (perform this protocol only)

CHARGEABLES:
- US Doppler Complete (CPT 93975)
- Add to US Renal if ordered together (US RENAL COMPLETE, CPT 76770)
  - See specific *US Renal* protocol for details regarding a complete renal examination.
- If a Limited Doppler is performed (e.g. only renal veins) add Limited Modifier (CPT 93976).

INDICATIONS:
- Increased creatinine, decreased urinary output, or other findings of poor renal function.
- Suspected renal artery thrombosis (examples: embolic event) or dissection.
- Suspected renal vein thrombosis.
- Abnormal findings on other imaging studies
- Typically this exam is reserved for hospitalized patients with unexplained poor renal function.

CONTRAINDICATIONS:
- No absolute contraindications

EQUIPMENT:
- Curvilinear transducer with a frequency range of 1-9 MHz that allows for appropriate penetration and resolution depending on patient's body habitus

PATIENT PREPARATION:
- Patient should be NPO for 4-6 hours prior to study. This may not be possible in the acute setting.

EXAMINATION:
  GENERAL GUIDELINES:
    A complete examination includes evaluation of:
    - Renal length on each side
    - Color and spectral evaluation of both main renal arteries.
    - Color and spectral evaluation of both main renal veins.
    - Abdominal aorta proximal to, at, and distal to the renal artery ostia.
    - IVC proximal to, at, and distal to the renal vein-caval junction.

  EXAM INITIATION:
  - Introduce yourself to the patient and explain test.
  - Verify patient identity using patient name and DOB.

- Obtain patient history including symptoms. Enter and store data page.
- Place patient in supine position. Right or left lateral decubitus (RLD, LLD) positioning may be required.

TECHNICAL CONSIDERATIONS:
- Review any prior imaging, making note of abnormalities or other findings requiring further evaluation – follow up.
- Optimize gain and display setting with respect to depth, dynamic range, and focal zones on grey scale imaging first. Reduce noise to be able detect partial thrombus in the main renal artery and veins.
- Renal Arteries: Using color Doppler, survey the main renal artery to the hilum.
- Renal Veins: Using color Doppler, survey the entire main renal vein to the hilum.
- Optimize color Doppler setting to show optimal flow
  - Adjust scale and gain to maximally fill the vessel of interest without artifact
    - Reduce color gain if "color bleed" is present. Too high gain may obscure a partial thrombus.
  - Optimize Doppler angle if no flow is seen (best is 0°). Use Power Doppler if no optimal angle can be optioned.
  - Look for a stenotic jet (i.e. aliasing) and/or post-stenotic turbulence.
  - In severe stenosis, a soft tissue color "bruit" may be present
- Use spectral Doppler to differentiate artery from vein if not apparent on color Doppler.
- Optimizing spectral Doppler:
  - Place time-gate centrally within the vessel of interest
  - Adjust scale to extend spectral waveform (amplitude adequate for interpretation)
  - Reduce aliasing for high flow evaluation

IMAGE DOCUMENTATION:
Perform the below imaging for both **RIGHT** and **LEFT** kidneys:
- Grayscale
  - Longitudinal images
    - Mid segment without and with maximum longitudinal measurement
  - Transverse images
    - Mid superior, Mid, Mid inferior
- Doppler

Anatomy	Grey Scale	Color Doppler	Waveform	PSV
Aorta: at renal arteries	x	x	x	x
Renal artery: mid	x	x	x	x
Vasculature at renal hilum	x	x		
Renal vein: mid	x	x	x	
Renal vein: proximal	x	x		
IVC: at level of the renal veins	x	x	x	
Data page with measurements				
PSV = peak systolic velocity				

PROCESSING:
- Review examination data

- Export all images to PACS
- Confirm data Imorgon (where applicable)
- Note any study limitations (in Epic Study Note or paper communication, per Radiologist preference)

REFERENCES:
- ACR-AIUM Practice Guideline (Revised 2007)
- ICAVL Guidelines (Updated 8/2012)

CHANGE HISTORY:

STATUS	NAME & TITLE	DATE	BRIEF SUMMARY
Submission	David Fetzer, MD, Director	**02/07/2016**	Submitted
Approval	David Fetzer, MD, Director	**02/07/2016**	Approved
Review	Anthony Setiawan, MD	**11-14-2018**	Reviewed
Revisions	David Fetzer, MD	**06-19-2017**	Changes to list of relevant orders to reflect consolidation of EPIC orderables.
	David Fetzer, MD	**01-14-2020**	Renamed protocol for clarity