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GENERAL CT GUIDELINES

FASTING

Patients should have nothing but clear liquids at least 4 hours before the exam. Most outpatients are told to have clear liquids only, after midnight (even if the scan is in the afternoon). The patients should not be NPO, they should be well hydrated for the exam in order to decrease renal complications from I.V. contrast.

IV CONTRAST

All abdominal studies are currently performed with Omnipaque 350, at a dose of 100mL. Exceptions include triple phase liver exams and lower extremity run-off studies, for which 125mL is necessary.

CT DENSITIES

Air, fat:	Negative Hounsfield units (HU)
Fluid:	0-20 HU
Abscess:	0-40 HU
Parenchyma:	40-70 HU (non contrast)
Bone:	> 500 HU
Calcified Lung Nodule	>200 HU

RETROSPECTIVE RECONSTRUCTION

Remember that one of the advantages of MDCT is the ability to retrospectively reconstruct the data. The minimum slice thickness depends on the detector configuration used for the particular scan. It is best to do reconstructions soon after the scan (< 24-48 hours) because the raw data is only saved temporarily. Thin recons also provide much better MPR images and we are using these more and more.

BREATH HOLD

If possible, all abdominal CT scanning should be done during a single breath hold. It is often helpful to coach the patient regarding breathing, and hyperventilating the patient prior to scanning. Emphasize to the patient that it is important that he or she does not breathe or move during the study. If it is absolutely necessary to let the breath out early, tell them to let it out slowly and evenly because this causes less motion artifact. Instruct the patient to take a deep breath in and out several times. Prior to scanning, ask the patient to take a medium-sized breath in and hold it. When performing a multiphase study such as a triple-phase liver or pancreas protocol, instruct the patient to try to take the same sized breath with each scanning phase. With 16 slice scanners and above, quite shallow breathing may be best approach.

ORAL CONTRAST

Positive oral contrast is usually dilute iodinated contrast or barium (1 - 3% concentration). More and more we are now using negative oral contrast such as water or Volumen. 250-300 cc of water should be given to all patients when the patient gets on the scanning table. This will ensure adequate distention of the stomach and duodenum.

Patients who may have a bowel perforation should be given dilute iodinated contrast and not dilute barium. Patients with suspected bowel obstruction do not require oral contrast because they usually have air and fluid within the bowel to provide negative contrast.

Patients with allergies to iodine that require positive oral contrast should receive dilute barium.

After the patient's exam has been protocolled by the radiologist, the radiology technologist prepares the oral contrast under the direction of the radiologist, which will then be administered by a radiology technologist or licensed independent practitioner (LIP).

These are the current guidelines for administration of oral contrast, broken down by type:

No Oral –

Acute Small Bowel Obstruction, Renal Stone

Water-

Protocol: 20 min prior – 400 mL, Table – 400 mL

Indications: Routine exams, CTA (Renal, Liver, Aorta, Adrenal/Renal Mass), HCC Screen, CTU, Pancreatic Mass

VoLumen/Breeza –

Dose: VoLumen/Breeza 3 bottles of 450mL or 500mL

Protocol: 60 min prior – 1st bottle, 40 min prior – 2nd bottle, 20 min prior – 3rd bottle,
Table – 400 mL water

Indications: Inflammatory Bowel Disease, Small Bowel Mass/Cancer, GI Bleed, Malabsorption/diarrhea, CTA - Mesenteric

Barium –

Dose: Barium 2.1% w/v 450mL bottle

Protocol: 60 min prior – 225 mL, 30 min prior – 225 mL, Table – 400 mL water

Indications: Patients with an allergy to iodine or other contraindication to iodinated contrast that require positive oral contrast as outlined below.

Iodinated Oral Contrast –

Dose: Omnipaque 350 – 50mL diluted in 1000 mL

Protocol: 60 min prior – 500 mL, 30 min prior – 500 mL, Table – 400 mL water

Indications: Non-acute small bowel obstruction to assess transit (120 min & 60 min prior), Assess known or suspected proximal bowel perforation/leak, Patients who cannot receive intravenous iodinated contrast with indications that would otherwise require it

Note: Strongly recommend water or VoLumen for assessment of patients with GIST, Kaposi's or other known/suspected small bowel or hypervascular malignancies (carcinoid, etc)

UNOPACIFIED BOWEL LOOPS

If masses are present which may represent unopacified loops of bowel you have several choices:

1. Give IV contrast if not previously given
2. Give rectal contrast or air if unopacified loops are in the pelvis.
3. Give oral contrast and repeat scan in a few minutes if unopacified loops are in the upper abdomen.
4. Repeat scan at same level. The bowel may have changed in shape due to peristalsis. Ideally, it will also be filled with contrast.

5. Give more oral contrast and repeat scan at same level several hours later. Bowel loops may become opacified and/or change in configuration.
6. Try decubitus or prone views. Loops of bowel will change position and may fill with contrast or air.
7. Inject contrast through colostomy, ileal loops, or other pouches in patients who have these. Many times the loops of bowel adjacent to the stoma may not opacify with oral contrast. By injecting the stomas directly (i.e. with a small catheter) good opacification of these bowel loops can be obtained.
8. Metoclopramide (Reglan) 10 mg po promotes gastric emptying and quickens bowel transit of contrast, although this is rarely given.
9. Suspected bowel wall thickening or intraluminal bowel mass: stool may mimic a mass or wall thickening. Wall thickening is a common over call on CT scans. If suspected, delayed scans, positional changes, and other maneuvers described above should be performed. The viscus should be well distended. For the stomach, fizzes and water should be given for distension if wall thickening is suspected.

RECTAL CONTRAST

Rectal contrast is often administered in patients with penetrating abdominal injury (to r/o colonic perforation) or in patients being evaluated for or following colorectal surgery for inflammatory bowel disease or malignancy. As most of these procedures are staged (requiring multiple surgeries) assessment of the primary bowel anastomosis is often necessary prior to re-establishing continence. After the patient's exam has been protocolled by the radiologist, the radiology technologist prepares the rectal contrast under the direction of the radiologist, which will then be administered by a radiology technologist or licensed independent practitioner (LIP).

Rectal contrast is administered via a soft catheter without a balloon. One option is small bore red rubber catheter. The catheter should be generously lubricated with gel prior to insertion. The catheter should be inserted 2-3 inches into the rectum. Contrast should then be administered via gravity using an enema bag (1 - 3% hypaque or water preferably) while the patient is on the scanning table. The technologist should aid the patient in holding the catheter in place during filling. Stop the contrast if the patient begins to experience significant discomfort. In patients where we are only scanning the pelvis, 300 mL of contrast is adequate. In patients where we are scanning both the abdomen and pelvis, a minimum of 600mL is desired. Keep in mind that the normal colon typically can accommodate at least 1 liter of contrast.

VAGINAL CONTRAST

Vaginal contrast should be administered to patients with a history of cervical or endometrial malignancy to enable better evaluation of the vagina, cervix, vaginal cuff and parametrial tissues. Vaginal contrast is administered via a catheter while the patient is on the scanning table. 60 mL of surgilube or equivalent aqueous gel should be administered in the presence of a female technologist, LIP, or chaperone. STOP if patient has significant discomfort.

After the patient's exam has been protocolled by the radiologist, the radiology technologist prepares the vaginal contrast under the direction of the radiologist, which will then be administered by a radiology technologist or licensed independent practitioner (LIP).

ADDITIONAL TECHNICAL CONSIDERATIONS

- Patients should not be NPO, but on clear liquids. Intravenous contrast should be given at 3-5 ml/sec of Optiray 350 for a total of 100-125mL, followed by saline. Please use small ROI's in

order to minimize errors associated with patient motion. Injection should be via an 18-20 gauge angiocath in the antecubital vein.

- When using SMART PREP please remember that there is a 5-10 second delay from when you initiate the scan to when the machine acquires its first image. Therefore, it is critical that you start the scan IMMEDIATELY after the threshold or time delay specified in the protocols, since the indicated settings account for this delay.
- Focal spot – At 120 kV, if the mA is less than 570, the machine will default to the small focal spot, providing greater detail on the images. After obtaining the topogram on all patients, review the mA table. If any mA is greater than 570, decrease the rotation speed to bring the mA within range if possible. If this is not possible, keep the rotation speed at 0.5. If using the HiRes HD setting, the max mA must be less than 420 to use the small focal spot.
- For all patients less than 20 years old, set the minimum mA to 80 for all studies or other pediatric protocol settings as suggested by the scanner.
- Remember that if you change parameters for any series in a multiphase study, you MUST make the same changes to the other series in that exam!

ROUTINE ABDOMEN/PELVIS

Please note that the “routine abdomen/pelvis” protocol serves as a starting point for many examinations. Please see the comments below for tailoring the examination for specific indications.

Contrast:

- Oral: 800mL of water (default)
- Intravenous : Omnipaque 350 100mL at 3-5 ml/sec

Scan method:

- Portal Venous phase - “SMART PREP”, ROI over liver (50 HU above baseline), dome of liver to SP
- Coronal and sagittal reformats of portal venous phase, 3mm reconstructions

Comments:

ED studies -

Appendicitis – Default examination should be water and with IV. In pediatric patients, consider also administering oral contrast.

Diverticulitis – Default examination should be water and with IV.

Cervical or endometrial cancer –

Patient with a known diagnosis undergoing staging or follow-up. Patient places 60-120mL of surgilube via catheter in her vagina prior to scanning

Positive oral contrast

Although the default is with water for oral contrast, there may be special scenarios where positive oral contrast is desired. Examples may include evaluation for a leak in patients with suspected or known bowel perforation following surgery, or to assess transit in someone with a known bowel obstruction that has not responded to conservative management. Consider a longer than normal prep time in cases where patients are not likely to have normal motility.

ABDOMEN/PELVIS with DELAY

Indications:

- Concern for pyelonephritis
- Suspicion of non-GI bleeding following procedure

Contrast:

- Oral: 800mL of water (default)
- Intravenous : Omnipaque 350 100mL at 3-5 ml/sec

Scan method:

- Portal Venous phase - “SMART PREP”, ROI over liver (50 HU above baseline), dome of liver to SP
- Delay phase – 3min after contrast, dome of liver through bottom of kidneys, extend through pelvis if concern for bleeding
- Coronal and sagittal reformats of portal venous phase, 3mm reconstructions

NON CONTRAST ABDOMEN/PELVIS

Indications:

- Suspicion for retroperitoneal hemorrhage due to anticoagulation or spontaneous hemorrhage
- Evaluation of patient for pathology that would normally be assessed with intravenous contrast, but contrast is contraindicated. In this instance, perform with positive oral contrast

Notes:

- DO NOT USE if there is concern for retroperitoneal hemorrhage secondary to intervention or trauma. Those should be performed with intravenous contrast.
- This is not to be used for renal stones. Use RENAL STONE protocol for those due to lower dose technique.

Contrast:

- Oral
 - None or Omnipaque 350 – 50mL diluted in 1000 mL or Barium if allergic to iodine
- No IV contrast

Scan Method:

- Dome of liver to symphysis pubis
- Coronal and sagittal reformats

TRAUMA

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 100mL at 3-5 ml/sec

Scan Method:

- Portal venous phase - “SMART PREP”, ROI over liver (50 HU), liver through inferior pubic rami
- Delayed scans thru kidneys at 4 minutes, through SP if pelvic injury known or detected on initial set of images
- Coronal and sagittal reformats of portal venous phase

Comments:

- Clamp Foley prior to scan
- If renal injury is present, make sure collecting system is opacified. If necessary, repeat examination of the kidneys at a 10 minute delay. If bladder injury is suspected, a CT cystogram must be performed to exclude perforation.
- If penetrating injury to a site that places the patient at risk for colonic injury, rectal contrast should be administered as described above.
- If pelvic fractures are present, scan the entire abdomen and pelvis during the delays to assess for extravasation.

CT CYSTOGRAPHY – TRAUMA & R/O LEAK

If bladder injury is suspected because of multiple pelvic fractures, you should do a CT cystogram following the routine abdominal CT. **You need to actively distend the bladder in order to exclude bladder injury. Passive filling of the bladder via the IV injection is not sufficient to exclude rupture. If bladder leak is suspected following a procedure (biopsy, prostate resection, reconstruction, etc), you must obtain precontrast images of the pelvis (r/o leak protocol).**

- In the setting of trauma, the Foley catheter must be placed by the trauma or emergency service, who should have already cleared the patient from possible urethral injury. For r/o leak, contact urology/clinical team at the time of protocolling to find out if the patient will arrive with a Foley in place. If the patient will not arrive with a Foley, find out whether there has been difficulty placing a catheter in the past and, if so, make sure someone is available as back-up if we are unable to place it.
- Inject 200-300 cc of dilute contrast in bladder via Foley catheter by gravity. Dilute contrast is a 2-3% solution of iodine. (75-100 mL of 350 Omnipaque contrast in a 1 liter saline bag.)
- Scan lower abdomen and pelvis. Check for intraperitoneal extravasation along gutters and between bowel loops. Check for extraperitoneal extravasation anterior to the bladder and along the anterior abdominal wall and scrotum. **Post-void images are not necessary for assessment of traumatic bladder rupture. If assessment is for r/o leak, consider obtaining post-void imaging if the filled images do not demonstrate a leak.**
- **Pre-filling images are not necessary if the patient has just had a routine pelvic CT. If none are available or if the study is for r/o leak, obtain pelvic CT prior to filling.**

QUAD PHASE LIVER (+/- PELVIS)

(Non contrast, arterial, portal venous, equilibrium)

Indications:

- after chemoembolization or ablation of primary or metastatic liver malignancy
- follow-up of a metastatic disease to the liver with previously documented intrinsic high attenuation (calcifications, hemorrhage)

Pelvis:

- Include if known pelvic pathology in primary liver malignancy

- Include if performed for metastatic liver malignancy

Notes:

- DO NOT USE for surveillance or follow up for patients with HCC/Cholangio that has not been previously treated. Use TRIPLE PHASE liver for that, as noncontrast imaging is not necessary in the absence of pre-existing high attenuation material in the liver due to intervention.
- DO NOT USE for further characterization of a liver lesion not well evaluated on prior imaging study. Use TRIPLE PHASE liver for that.
- all phases must be performed with IDENTICAL parameters.

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 125mL at 4-5 ml/sec

Scan Method:

- Pre contrast – top to bottom of liver
- Arterial phase – Initiate scan no sooner than 25 sec. Use “SMART PREP” Aorta (150HU) to monitor those with poor cardiac output. Top to bottom of liver. Ideally obtain excellent pancreatic parenchymal arterial opacification with minimal contrast in portal vein.
- Portal venous phase – 80 sec delay. Scan either abdomen or abdomen/pelvis as appropriate per protocol
- Equilibrium Phase – 3 min delay (top of liver to bottom of kidneys)
- Coronal and sagittal reformats of arterial and portal venous phase

TRIPLE PHASE LIVER (+/-PELVIS)

(arterial, portal venous, equilibrium)

Indications:

- surveillance or follow-up for primary liver malignancy
- further characterization of a previously indeterminate liver lesion

Pelvis:

- include if known or suspected pelvic abnormality requiring imaging
- recommend including if follow-up for known cholangiocarcinoma due to risk for metastases
- DO NOT include if for further characterization of previously indeterminate liver lesion and pelvis was imaged at that time and was unremarkable

Notes:

- DO NOT USE if the patient has previously had ablation or embolization. Use QUAD PHASE liver for that, as pre-existing high attenuation material can make assessment for enhancement difficult without comparison noncontrast images
- all phases must be performed with IDENTICAL parameters.

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 125mL at 4-5 ml/sec

Scan Method:

- Arterial phase – Initiate scan no sooner than 25 sec. Use “SMART PREP” Aorta (150HU) to monitor those with poor cardiac output. Top to bottom of liver. Ideally obtain excellent pancreatic parenchymal arterial opacification with minimal contrast in portal vein.
- Portal venous phase – 80 sec delay. Scan either abdomen or abdomen/pelvis as appropriate per protocol
- Equilibrium Phase – 3 min delay (top of liver to bottom of kidneys)
- Coronal and sagittal reformats of arterial and portal venous phase

DUAL PHASE (+/-PELVIS)

(arterial, portal venous)

Indications:

- Detection or follow-up of liver metastases in patients with malignancies known to produce hypervascular metastases (renal, melanoma, neuroendocrine [carcinoid, islet cell, pheochromocytoma, etc.], GI stromal tumor, sarcomas, and thyroid.)
- Pre-treatment staging of known adrenal malignancy
- Post treatment follow-up for renal or pancreatic malignancy
- Follow-up of size of renal mass that has been previously fully characterized
- Assessment for complications of pancreatitis
- Follow-up of a previously characterized or likely benign liver lesion in a patient without underlying liver disease
- History of liver transplant for indications other than surveillance for HCC

Pelvis:

- Include if surveillance/follow-up of metastatic disease or treated malignancy
- Include if pretreatment staging of renal malignancy
- Include if for follow-up of size of renal mass that has been previously fully characterized AND pelvic imaging is specifically requested

Notes:

- Do NOT use this protocol for breast or testicular ca patients. For such patients, use ROUTINE ABDOMEN/PELVIS, unless suggested otherwise by prior exams.
- For indeterminate liver lesion or likely primary hepatic malignancy use TRIPLE PHASE
- all phases must be performed with IDENTICAL parameters.

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 125mL at 4-5 ml/sec

Scan Method:

- Arterial phase – Initiate scan no sooner than 25 sec. Use “SMART PREP” Aorta (150HU) to monitor those with poor cardiac output. Top of liver to iliac crest. Ideally obtain excellent pancreatic parenchymal arterial opacification with minimal contrast in portal vein.
- Portal venous phase – 80 sec delay. Scan either abdomen or abdomen/pelvis per protocol
- Coronal and sagittal reformats of portal venous phase

LIVER DONOR

(angiographic, portal venous)

Indications:

- Preoperative evaluation of living related liver donor

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 125mL at 4-5 ml/sec

Scan Method:

- Angiographic phase –Top of liver to iliac crest.
- Portal venous phase – 80 sec delay. Top of liver to iliac crest
- Coronal and sagittal reformats of angiographic and portal venous phase
- Coronal MIP angiographic phase

ADRENAL MASS (+/-PELVIS)

Indications:

- known adrenal lesion incompletely characterized on prior imaging studies
- follow-up of a previously characterized indeterminate or benign adrenal lesion
- patients with biochemical evidence of adrenal pathology

Pelvis:

- Include ONLY if pelvic imaging is specifically requested to evaluate suspected or known pelvis pathology

Notes:

- all phases must include the aortic bifurcation to exclude paraganglioma at this location (can present with similar symptoms and signs)
- Do not use this protocol to preoperatively stage an adrenal lesion. Preop staging of primary adrenal malignancy should be done as a dual phase abdomen/pelvis for proper assessment of the regional vessels. Staging or assessment for a primary malignancy that may be metastatic to the adrenal gland should be performed as appropriate for primary malignancy.

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Noncontrast - Single breath from liver dome to iliac crest – needs to be checked
- Portal venous phase – 80 sec delay. Scan either abdomen or abdomen/pelvis as protocolled
- Delay Phase – 15 minutes from injection (top of liver to iliac crest)
- Coronal and sagittal reformats of portal venous phase

General Notes:

If the noncontrast images demonstrate a homogeneous lesion that is less than 10 HU, the lesion is highly likely to be an adrenal adenoma and no further imaging is necessary. Therefore, the radiologist should check the noncontrast images prior to proceeding with the remainder of the study unless evaluation of the remainder of the abdomen or pelvis was requested for other reasons.

RENAL MASS (+/-PELVIS)

Indications:

- initial evaluation of a patient with symptoms worrisome for a renal malignancy, but no prior imaging
- characterization of a renal lesion inadequately assessed previously
- characterization of a previously indeterminate renal lesion (Bosniak 2F, indeterminate enhancement, etc)
- consider use for initial post-treatment scan for renal malignancy due to possible treatment related high-attenuation material in treatment area
- pretreatment staging of known renal malignancy
- high suspicion for COMPLICATED pyelonephritis, such as abscess/phlegmon

Pelvis:

- include for initial evaluation of a patient with symptoms worrisome for a renal malignancy, but no prior imaging
- include if there is concern for or known pelvic pathology

Notes:

- all phases must be performed with IDENTICAL parameters.
- Patient being assessed for pyelonephritis should be imaged using the ROUTINE ABDOMEN/PELVIS protocol.

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan Method:

- Noncontrast – Top to bottom of kidneys - use low dose technique similar to renal stone protocol
- Corticomedullary Phase – 30 sec delay - Top of liver to bottom of kidneys
- Nephrographic Phase – 90 sec delay- Scan either abdomen or abdomen/pelvis as protocolled
- Delayed Phase – 4 minute delay – Top of liver to bottom of kidneys
- Coronal and sagittal reformats of nephrographic phase
- Coronal MIP of corticomedullary phase

General Notes:

Low attenuation masses in the medulla may be missed if only corticomedullary phase scanning is performed.

Noncontrast scans for baseline attenuation values are important in differentiating abscess (should not enhance more than 10 HU) from focal pyelonephritis or phlegmon (enhance significantly after iv contrast, but less than more normal parenchyma).

RENAL STONE

Indications:

- History of renal/ureteral stones with symptoms consistent with renal colic
- Follow-up stone burden in patient with known renal/ureteral stones
- High degree of suspicion for renal/ureteral stones

Notes:

- If there is concern for other acute pathology or uncertainty for diagnosis of renal colic, perform as ROUTINE ABDOMEN/PELVIS or as otherwise appropriate for the other concern

Contrast:

- Oral: none
- Intravenous : none

Scan Method:

- Noncontrast – Top of kidneys through SP using low dose technique
- Coronal and sagittal reformats of nephrographic phase

General Notes:

Most ureteral stones are at UVJ. Look for ureteral stone and secondary signs (i.e. hydronephrosis, periureteral or perinephric stranding, enlarged kidney).

AIDS patients on protease inhibitors (i.e. Indinovir) may have non-opaque stones.

RENAL ARTERY STENOSIS

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Arterial: Top of kidneys to SP
- Nephrographic: 90sec, Top of kidneys to iliac crest
- Coronal and sagittal reformats of arterial phase
- Coronal MIP of arterial phase

3D Reconstructions:

- Shaded surface display of renal arteries and aorta
- Curved MPR of each renal artery

RENAL DONOR/UPJ

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Noncontrast: Top to bottom of kidneys – study must be checked at this point if there is hydronephrosis in a donor as this may require imaging the remainder of the abdomen and pelvis prior to contrast to r/o stone
- Arterial: Top of kidneys to iliac bifurcation
- Nephrographic phase: 90 sec delay from top of liver to SP
- Delay: 7-10min delay
 - For Donor: perform topogram to assess for collecting system anatomy and have radiologist check, if any questions, do as UPJ
 - For UPJ: do as CT urogram delays
- Coronal and sagittal reformats of nephrographic phase
- Coronal MIP of arterial phase
- Coronal MIP and reformats of urogram phase if done

3D Reconstructions:

- Shaded surface displays of arterial, venous, and delayed phases
- Measurements:
 - Total renal lengths
 - Renal artery lengths from aorta to hilum (and first branch if proximal to hilum)
 - Right renal vein(s) from hilum to IVC
 - Left renal vein(s) from hilum to IVC
 - Left renal vein(s) from left lateral aortic border to hilum

RENAL RECIPIENT

Contrast:

- Oral: Water 800mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Arterial: Top of kidneys to SP
- Venous: 2min delay from iliac crest to SP
- Coronal and sagittal reformats of arterial phase
- Coronal MIP of arterial phase

3D Reconstructions:

- Shaded surface display of arterial phase

UROGRAM

Indications:

- Hematuria work up
- Known or suspected urothelial malignancy that has not been previously treated or has been incompletely evaluated

Notes:

- If patient has undergone treatment for urothelial malignancy or if this is performed for

follow-up of a prior Urogram, perform as UROGRAM POST TREATMENT/FOLLOW-UP

- Suspicion for primary renal malignancy should be performed as RENAL MASS protocol

Contrast:

- Patient should drink 32 oz of water upon arrival to department; patient should be well hydrated and encouraged to drink.
- IV: Omnipaque 350 100 mL per below with 250 cc of normal saline via IV

Scan method:

- Noncontrast - Top to bottom of kidneys, low dose
- Give IV contrast followed by normal saline
- Nephrographic - 90 sec, Dome of liver to SP
- Excretory – 10 minute delay in the prone position, top of kidneys to SP
- Coronal and sagittal reformat of the nephrographic and excretory phases of the entire abdomen and pelvis
- Coronal and sagittal MIP of excretory phase

3D Reconstructions:

- Shaded surface display of delayed phase(s) for collecting systems and kidneys
- Thick MIP

Comments

If little to no excretion is present on delayed phase, consider rescanning or getting a follow-up KUB.

If high grade obstruction is present on noncontrast, consider contacting ordering doc as to how to proceed.

For ureters with significant hydro and delayed excretion, get follow up KUB at 2 hours and see if ureter is opacified. KUB can be repeated as needed

If patient is <50 yrs old and study is ordered by non-urologist, consider contacting ordering physician at time of protocolling to see if study can be terminated after noncontrast if renal stones are present. If yes, please note this in comments on protocol and ask technologist to check with rad prior to giving contrast. Please note this conversation must take place at the time of protocolling – not at the time of the exam as this delays patient care.

UROGRAM POST TREATMENT/FOLLOW UP

Indications:

- Previously treated urothelial malignancy, now undergoing surveillance or concern for recurrence
- Follow up of prior indeterminate UROGRAM

Notes:

- Initial hematuria work-up should be performed as UROGRAM

Contrast:

- Patient should drink 32 oz of water upon arrival to department; patient should be well hydrated and encouraged to drink.

- IV: Omnipaque 350 100 mL per below with 250 cc of normal saline via IV

Scan method:

- Give IV contrast followed by normal saline
- Nephrographic - 90 sec, Dome of liver to SP
- Excretory – 10 minute delay in the prone position, top of kidneys to SP
- Coronal and sagittal reformat of the nephrographic and excretory phases of the entire abdomen and pelvis
- Coronal and sagittal MIP of excretory phase

3D Reconstructions:

- Shaded surface display of delayed phase(s) for collecting systems and kidneys
- Thick MIP

Comments

If little to no excretion is present on delayed phase, consider rescanning or getting a follow-up KUB.

For ureters with significant hydro and delayed excretion, get follow up KUB at 2 hours and see if ureter is opacified. KUB can be repeated as needed

PANCREATIC MASS (+/-PELVIS)

Indications:

- initial evaluation of a patient with symptoms worrisome for a pancreatic malignancy, but no prior imaging
- initial staging and characterization of a pancreatic lesion identified on prior imaging that was not adequate for staging/characterization

Pelvis:

- include for initial evaluation of patient without prior imaging
- include for follow-up of treated (surgery, radiation, chemotherapy) pancreatic malignancy undergoing surveillance or monitoring for response to therapy as can be helpful for assessing post surgical anatomy/complications
- DO NOT include for follow-up of lesion of low malignant potential (cyst, side branch IPMN) unless there is specific concern for or known pelvic pathology

Notes:

- Do NOT use this protocol for routine pancreatitis. Pancreatitis work-up should be done as ROUTINE ABDOMEN/PELVIS.
- Do NOT use this protocol for complications of pancreatitis – that should be done as DUAL PHASE to facilitate assessment of arteries
- Do NOT use this protocol for follow-up after pancreatic surgery – that should be done as DUAL PHASE
- Do NOT use this protocol for follow up size of pancreatic cystic lesions of low malignant potential – those can be done as ROUTINE ABDOMEN/PELVIS

Contrast:

- Patient should drink water as the oral contrast, in addition to 32 oz of water upon arrival to department. **OPACIFICATION AND DISTENTION OF DUODENUM IS VERY HELPFUL**

- Intravenous : Omnipaque 350 125mL at 4-5 ml/sec

Scan Method:

- Try to scan entire pancreas in single breath hold for all phases.
- Arterial phase –Top of liver to iliac crest.
- Portal venous phase – 80 sec delay. Scan abdomen or abdomen/pelvis per protocol
- Coronal and sagittal reformats of arterial and portal venous phases

ENTEROGRAPHY IBD

Indications:

- Inflammatory bowel disease or malabsorptive disorder
- Intermittent bowel obstruction, evaluate for adhesions

Notes:

- Do NOT use this protocol for obscure gastrointestinal bleeding or bowel tumor
- Do NOT use this protocol for evaluation of acute small bowel obstruction, ROUTINE ABDOMEN/PELVIS should be used for acute SBO
- In young patients or patients with multiple prior exams, consider contacting ordering physician to discuss use of MR enterography instead to decrease future radiation or provide additional information

Contrast:

- Oral: Volumen 0.1%/v: 3 bottles of 450 mL each
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Enteric phase – 50 sec delay. Scan from the liver dome to the SP
- Coronal and sagittal reformat of enteric phase

ENTEROGRAPHY GI BLEED/TUMOR

Indications:

- Obscure gastrointestinal bleeding (GI bleed not seen on upper or lower endoscopy)
- Suspicion for or history of small bowel tumor

Notes:

- Do NOT use this protocol for inflammatory bowel disease
- Do NOT use this protocol for evaluation of acute small bowel obstruction, ROUTINE ABDOMEN/PELVIS should be used for acute SBO
- Do NOT use this protocol for assessment of acute GI bleeding in the emergent/inpatient setting. Oral contrast is not appropriate in that setting and more often the etiology is a vascular lesion/injury rather than an undiagnosed tumor. In this setting, use Mesenteric Ischemia protocol.

Contrast:

- Oral: Volumen 0.1%/v: 3 bottles of 450 mL each
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Enteric phase – 50 sec delay. Scan from the liver dome to the SP
- Delay phase – 2min delay. Scan from the liver dome to the SP
- Coronal and sagittal reformat of enteric phase

MESENTERIC ISCHEMIA

Indications:

- Concern for acute mesenteric ischemia
- Suspected acute gastrointestinal bleeding

Notes:

- Do NOT use this protocol for inflammatory bowel disease or small bowel tumor. This exam does not actively distend the small bowel, limiting evaluation for soft tissue masses.

Contrast:

- Oral: Water 800 mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Arterial: From liver dome to SP
- Venous: 90 sec delay from liver dome to SP
- Coronal and sagittal reformat of arterial and venous phases
- Coronal MIP of enteric phase

RECTAL CONTRAST ABDOMEN/PELVIS

Indications:

- R/o leak at colonic anastomosis above pelvis
- Suspicion for colonic injury/trauma

Notes:

- Follow protocol for instillation of rectal contrast
- Pre-rectal phase necessary due to presence of often high attenuation surgical material that may otherwise cause confusion for enteric leak

Contrast:

- No Oral Contrast
- Intravenous : Omnipaque 350 100mL at 3-5 ml/sec

Scan method:

- Noncontrast from dome to SP prior to rectal
- Place rectal contrast per guidelines with goal of at least 600mL
- Portal Venous phase - dome of liver to SP
- Coronal and sagittal reformats of portal venous phase, 3mm reconstructions

CT PELVIS WITHOUT ABDOMEN

Indications:

- Rectal or perianal abscess
- Other isolated pelvic pathology

Notes:

- Rectal contrast is not necessary and often not helpful for diagnosis of rectal/perianal abscess

Contrast:

- Oral contrast per specific indication, enter contrast in remarks below (please refer to main protocol document for indications)
Water 800 mL
Barium 2.1% w/v: 450mL total
Omnipaque 240: 50mL in 1000mL of water
- Intravenous : Omnipaque 350 100mL at 3-5 ml/sec

Scan Method:

- Venous phase – 80sec delay, iliac crest to SP
- Coronal and sagittal reformat of portal venous phase

RECTAL CONTRAST PELVIS

Indications:

- R/o leak at colonic/rectal anastomosis in pelvis

Notes:

- Follow protocol for instillation of rectal contrast
- Pre-rectal phase necessary due to presence of often high attenuation surgical material that may otherwise cause confusion for enteric leak

Typically used for patients with a low rectal anastomosis to rule out leak or collection prior to restoring continence.

Contrast:

- No Oral Contrast
- No IV contrast

Scan method:

- Noncontrast from iliac crest to SP prior to rectal
- Place rectal contrast per guidelines with goal of at least 300mL
- Rescan from iliac crest to SP
- Coronal and sagittal reformats of both phases, 3mm reconstructions

CT COLONOGRAPHY

Prep: Dry prep preferable but contraindicated in some patients (fleet soda / clean prep)

Stool and fluid tagging is performed: Tagitol taken with breakfast, lunch and dinner day before; 60

cc of gastrograffin night before

- . Night before and morning of the procedure bowel prep
- . Instruct patient to empty the bowel before the scan and to communicate when maximal distension is achieved

No oral, No IV contrast (unless indicated by radiologist), 1 mg of glucagons sc 10 minutes prior to scanning.

CO2 insufflation / Physician controlled / Use small rectal tube (test tube before using)

In a lateral decubitus position, place Rectal Tube, inflate balloon cuff.

Contact resident if there is any problem with catheter insertion.

Start insufflation with patient in prone position, when patient feels discomfort have patient turn onto their right side and then slowly supine and finally on left side (to fill right colon with air insufflate CO2 using the autoinsufflator at 25 mmHG as pressure limit. Usual volume of air to be administered fluctuates between 4-6.

Obtain scout view to ensure adequate insufflation of all segments of colon before scanning

Scan Method

Scan supine and prone

Low mAs = 100mA if BMI <40, use 150mA if BMI >40

Comments

Keep insufflating air between supine and prone positioning.

At end of study, cut tubing before removing rectal catheter for immediate relief of distention

Send Data to 3D workstation.

AORTIC DISSECTION

Contrast:

- Oral: specify in remarks
No oral contrast
Water 800 mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Noncontrast - Top of arch to diaphragm
- Arterial: SMART PREP over aortic arch with threshold 150 HU, Apices to SP,
- Delays – 4 min delay from dome of liver through kidneys to assess organ perfusion
- Coronal and sagittal reformat of arterial phase
- Coronal MIP of arterial phase

3D Reconstructions:

- Shaded surface display of aorta and branch vessels

General Comments:

- No oral contrast is given because it interferes with 3D reconstruction.
- Non-contrast scan may show intramural hematoma not well seen with contrast.
- If an aortic dissection is found in abdominal scan, consult the radiologist about obtaining a chest CT immediately after the scan

AORTIC ANEURYSM – PRE EVT

Use this protocol for initial evaluation of a known or suspected abdominal aortic aneurysm.

Contrast:

- Oral: specify in remarks
No oral contrast
Water 800 mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Arterial: SMART PREP over abdominal aorta with threshold 150 HU, From liver dome to SP,
- Delays: 4 min delay through liver and kidneys
- Coronal and sagittal reformat of arterial phase
- Coronal MIP of arterial phase

3D Reconstructions:

- Shaded surface display of aorta and branch vessels
- Measurements
 - Diameter adventitia to adventitia
 - Max aorta at lower renal artery
 - Max aorta 1 cm below lower renal artery
 - Max aorta 2 cm below lower renal artery
 - AAA at widest point
 - Minimum of each common iliac artery
 - Minimum of each external iliac artery
 - Minimum common femorals at inguinal ligament
 - Length
 - Lower renal artery to neck of aneurysm
 - Aneurysmal segment
 - Aortic bifurcation to each common iliac bifurcation

Comments

Study should only be performed in hemodynamically stable patients. Hemodynamically unstable patients with high degree of suspicion of aortic pathology should go directly to OR. If patient becomes unstable in CT, a quick noncon scan may be diagnostic.

AORTIC ANEURYSM – POST EVT

Use this protocol for follow-up of an abdominal aortic aneurysm that has had an endovascular stent repair.

Contrast:

- Oral: specify in remarks
No oral contrast
Water 800 mL
- Intravenous : Omnipaque 350 100mL at 4-5 ml/sec

Scan method:

- Noncontrast: Dome to SP
- Arterial: SMART PREP over abdominal aorta with threshold 150 HU, From liver dome to SP
- Delayed: 4 minute delay, Liver dome to SP – same parameters as used during noncontrast exam
- Coronal and sagittal reformat of arterial phase
- Coronal MIP of arterial phase

Comments

The noncontrast portion of the exam is to evaluate for pre-existing high density in the aneurysm, such as calcifications or prior embolization. The delayed phase is for evaluation for delayed leaks.

LOWER EXTREMITY RUN-OFF

Use this protocol for assessment of peripheral vascular disease

Contrast:

- Water oral contrast
- IV contrast at 4-5mL/sec

Scan method:

- Noncontrast: From diaphragmatic hiatus through toes
- Arterial: Use HiRes HD mode with Volume ASIR 30%
SMART PREP over knees – trigger scan at first blush of contrast. Do not use ROI!
From diaphragmatic hiatus through toes
- Coronal and sagittal reformat of arterial phase
- Coronal MIP of arterial phase

APPENDIX A– IMAGING PREGNANT PATIENTS

- 1 – Complete abdominal ultrasound
Include search of the RLQ for the appendix, gallbladder and bile duct eval, liver, kidneys.
- 2 – Complete pelvic ultrasound
Include both transabdominal and endovaginal exam. Make sure UVJ's are evaluated for possible stones. Evaluate for ureteral jets.
- 3 – OB US to include biometry
- 4 – Cross-sectional imaging – Discuss case with attending before performing MRI or CT.
In the first trimester, MRI is preferred over CT.
 - 1 – If CT: IV contrast at 5mm with 2.5 mm recons, with reduced mA as described in protocols
 - 2 – If MRI: call MRI fellow on call if after-hours and discuss with attending.

APPENDIX B - 4-SLICE BODY CT PROTOCOLS

Studies marked NR (not recommended) should be performed on a 16 slice or greater scanner if at all possible

ROUTINE ABDOMEN/PELVIS

Contrast:

- Oral
- Intravenous 3-5 ml/sec

Scan delay time:

- Portal Venous phase - "SMART PREP", ROI over liver (50 HU above baseline)
- Delayed scans thru kidneys at 3 minutes

Scan method:

5 mm, pitch of 1.5:1, Rotation speed(RS)=0.8 sec, 2.5 mm reconstructions
Coverage: dome of liver to S.P. (symphysis pubis).

PREGNANT PATIENT ABDOMEN/PELVIS *NR

Contrast:

- Oral
- Intravenous 3-5 ml/sec

Scan delay time:

- Portal Venous phase - "SMART PREP", ROI over liver (50 HU above baseline)
- Delayed scans thru kidneys at 3 minutes only if indicated by the radiologist following review of the initial phase

Scan method:

5 mm, pitch of 1.5:1, Rotation speed(RS)=0.8 sec, 2.5 mm reconstructions, max mA 175
Coverage: dome of liver to S.P. (symphysis pubis).

ROUTINE CHEST, ABDOMEN AND PELVIS

Contrast:

- Oral
- Intravenous 3-5 ml/sec

Scan delay:

- Portal venous phase - "SMART PREP", ROI over liver (50 HU), 5 mm,
- Delayed scans thru kidneys at 3 minutes

Scan method:

5 mm, RS=0.8, single breath if possible.
Coverage: thoracic inlet to S.P. (symphysis pubis).

RETROPERITONEAL HEMORRHAGE
(AKA - Non-contrast Abdomen/Pelvis)

Contrast:

- No oral contrast; if IV, 4-5 cc/sec, “SMART PREP” liver (40 HU)

Scan Method:

- 5 mm, RS=0.8, dome of liver to symphysis pubis

TRAUMA

Contrast:

- Water as oral contrast
- Intravenous 3-5 ml/sec

Scan Method:

- “SMART PREP”, ROI over liver (50 HU)
- 5 mm, RS=0.8, 2.5 mm reconstructions
- Delayed scans thru kidneys at 3 minutes

CT CYSTOGRAPHY

Same as above

TRIPLE PHASE LIVER – HCC *NR

(Non contrast, arterial, portal venous, equilibrium)

Contrast:

- Oral water
- Optiray 350 IV contrast, hyperventilate patients prior to breath hold. Scans should be done in single breath for each phase. Injection should be performed to administer entire contrast load in approximately 30 sec. A higher ma (approx 350 depending on size of patient) should be used to better resolution.

Scan Method:

- 5 mm, RS=0.8 (same for remainder)– pre contrast – top to bottom of liver
- 5 mm – post contrast – top to bottom of liver for arterial phase, 2.5 mm recon
- Arterial phase – “SMART PREP” Aorta (170HU baseline) (usual delay 30 sec) Ideally obtain excellent hepatic arterial opacification with minimal contrast in portal vein;
- Portal venous phase – 5mm at 70 sec delay with 2.5 mm recon. Scan the entire abdomen in this acquisition (top of the liver to sp)
- Equilibrium Phase – 5 mm at 180 sec delay with 2.5 mm recon (top of liver to bottom of kidneys)

DUAL PHASE LIVER *NR

(arterial, portal venous, delay)

Contrast:

- Oral water
- hyperventilate patients prior to breath hold. Scans should be done in single breath for each phase.

Scan Method:

- 5 mm RS=0.8 (same for remainder) with 2.5 mm recon– post contrast – top to bottom of liver for arterial phase
- Arterial phase – “SMART PREP” Aorta (170HU baseline) (usual delay 30 sec) Ideally obtain excellent hepatic arterial opacification with minimal contrast in portal vein;
- Portal venous phase – 5mm with 2.5 mm recon at 80 sec delay. Scan the entire abdomen in this acquisition (top of the liver to sp)
- Delay Phase – 5 mm with 2.5 mm recon 3 minutes from injection (top of liver to bottom of kidneys)

ADRENAL MASS

Contrast:

- No oral
- IV at 3-4 mL/sec

Scan method:

- Noncontrast - 5 mm, RS=0.8 (same for remainder), single breath from liver dome to bottom of kidneys, reconstruct at 2.5 mm intervals – needs to be checked
- Portal venous phase – 5mm at 80 sec delay. Scan from the liver dome to the SP in this acquisition if evaluation of the pelvis is desired, otherwise only the abdomen (top of liver to bottom of kidneys) needs to be scanned – reconstruct at 2.5 mm intervals
- Delay Phase – 5 mm 15 minutes from injection (top of liver to bottom of kidneys) – reconstruct at 2.5 mm intervals

RENAL MASS *NR

Contrast:

- Water oral contrast.
- IV at 4-5mL/second

Scan Method:

- Noncontrast – 5mm RS=0.8 (same for remainder) top to bottom of kidneys using same MA as post IV scans
- Corticomedullary Phase – 5mm 30 sec delay with 2.5 mm recons- Top of liver to bottom of kidneys
- Nephrographic Phase – 5mm 80 sec delay with 2.5 mm recons- Top of liver to SP
- Delayed Phase – 5mm 3 minute delay with 2.5 mm recons– Top of liver to bottom of kidneys

RENAL STONE

Contrast:

- No oral, no I.V. initially

Scan method:

- 5 mm, RS=0.8, single breath top of kidney to bottom of bladder, reconstruct at 2.5 mm intervals
- When stone is detected in ureterovesical junction vs. bladder, acquire axial images through the bladder in prone position

If IV contrast is needed, timing is based on why IV contrast is being given:

- 3-4 ml/sec for 125 ml (Optiray 320)
- 80 sec delay, scan 5 mm top of liver to SP for incidental abdominal pathology
- 6 min scan delay or longer, 5 mm top of kidneys through SP for delineation of ureters.

RENAL ARTERY STENOSIS *NR

Contrast:

- No oral
- IV at 3-4 mL/sec

Scan method:

- Noncontrast: 5 mm, 30 HS from top of kidneys to iliac bifurcation
- Arterial: smart prep over aorta with threshold 100 HU, 2.5mm, 3.75 HQ with 1.25mm reconstruction from top of kidneys to SP

RENAL UPJ/DONOR *NR

Contrast:

- No oral
- IV at 3-4 mL/sec

Scan method:

- Noncontrast: 5 mm, RS=0.8 from top to bottom of kidneys – study must be checked at this point as hydronephrosis in donor may require imaging the remainder of the abdomen and pelvis to r/o stone
- Arterial: smart prep over aorta with threshold 100 HU, scan 2.5mm, RS=0.7 with 1.25mm reconstruction from top of kidneys to iliac bifurcation
- Nephrographic phase: 80 sec delay from top of liver to SP, RS=0.8, 5mm with 2.5 mm recons
- Delay: 7-10min delay
- For Donor: perform topogram to assess for collecting system anatomy, if any questions, do as UPJ
- For UPJ: do as CT urogram delays – top of kidneys to SP 2.5 mm, RS=0.8, recon 2.5mm

CT UROGRAPHY *NR

Contrast:

- No oral, patient should drink 32 oz of water upon arrival to department; patient should be well hydrated and encouraged to drink.
- IV at 3-4 mL/sec with 250 cc of normal saline via IV immediately following

Scan method:

- Noncontrast - 5 mm, RS=0.8 (same for remainder) recon 2.5mm from top of kidneys to iliac crest
- Nephrographic - delay 80 sec, 5mm with 2.5mm recon from dome of liver to SP
- Delay – Wait 8 minutes, perform a AP KUB (scanogram) to evaluate ureter opacification

If most of the ureters tract are visualized, scan entire abdomen (2.5 mm with 1.25mm recon) usually a 15 minute scan is best to opacify distal ureters.

If KUB does not show opacification of ureters, contact the radiologist and obtain another KUB using 1 minute intervals until adequate opacification is achieved.

If a portion of ureter is not opacified on delayed scan, rescan the unopacified segment after standing the patient and placing in the prone position. Do not scan more than 2 more times.

PANCREATIC MASS *NR

Contrast:

- Patient should drink water as the oral contrast, in addition to 32 oz of water upon arrival to department. **OPACIFICATION AND DISTENTION OF DUODENUM IS VERY HELPFUL**
- IV at 4-5 mL/sec

Scan Method:

- Try to scan entire pancreas in single breath hold for all phases. **Have patient try to reach same depth of inspiration as for localizing scan and contrast scan to avoid cutting off pancreas.
- Noncontrast – 5mm RS=0.8 (same for remainder), with 2.5 mm recons from liver dome to iliac crests
- Arterial phase – 2.5mm scan with 1.25mm reconstructions from top to bottom of liver at 35 sec delay, ideally obtain excellent hepatic arterial opacification with minimal contrast in portal vein;
- Portal venous phase – 5mm at 80 sec delay with 2.5 mm reconstructions. Scan the entire abdomen in this acquisition (top of the liver to sp).
- Delayed 3 minute scan through liver and kidneys.

CT ENTEROGRAPHY *NR

Contrast:

- Volumen oral contrast per protocol
- IV at 3-4 mL/sec

Scan method:

For Crohn disease or other diffuse bowel pathology; Portal venous phase study only is sufficient

For occult GI bleeding and search for GI malignancy: arterial, portal venous and delayed scans are usually needed.

Before giving IV contrast perform a low mA single slice through mid abdomen or topogram and check if there is adequate bowel distention. (Make sure most of Volumen is not in stomach)

- Arterial phase study – 5mm RS=0.7 with 2.5 mm reconstructions with a smart prep (HU=100), top of liver to SP
- Portal venous phase study – 5mm RS=0.8 at 80 sec delay. Scan from the liver dome to the SP – reconstruct at 2.5 mm intervals
- Delayed Phase – 5 mm RS=0.8 at 3 minutes from injection, top of liver to bottom of kidneys

CT COLONOGRAPHY

Scan Method

2.5, 7.5 mm/sec table speed HS
Scan supine and prone
Low mAs = 100 ma

AORTIC DISSECTION *NR

Contrast:

- No oral contrast
- IV at 4-5 mL/sec

Scan method:

- Noncontrast: 5 mm, RS=0.8 from top of arch to iliac crests
- Arterial: Smartprep over aortic arch with threshold 100 HU, 2.5mm, RS=0.7 with 1.25mm reconstruction from apices to SP
- **Portal Venous phase at 5 mm increments from dome of liver to SP to assess organ perfusion.**

AORTIC ANEURYSM – PRE EVT *NR

Contrast:

- No oral contrast
- IV at 4-5 mL/sec

Scan method:

- Noncontrast: 5 mm, RS=0.8 from top of arch to iliac crests
- Arterial: Smartprep over abdominal aorta with threshold 100 HU, RS=0.7, 2.5mm with 1.25mm reconstruction from liver dome to SP

AORTIC ANEURYSM – POST ENDOVASCULAR STENT *NR

Contrast:

- No oral contrast
- IV at 4-5 mL/sec

Scan method:

- Noncontrast: 5 mm, RS=0.8 from top of arch to iliac crests
- Arterial: Smartprep over abdominal aorta with threshold 100 HU, 2.5mm, RS=0.7 with 1.25mm and 2.5mm reconstruction from liver dome to SP
- Delayed: 3 minute delay, 2.5mm, RS=0.8 with 1.25mm and 2.5mm reconstruction from liver dome to SP – same parameters as used during arterial exam

CT PELVIS WITHOUT ABDOMEN

Contrast:

- Oral and
- IV at 3-5 mL/sec I.V., non-contrast if indicated, full bladder.

Scan Method:

- 80 sec. delay

- 5 mm, 15 HQ

LIVING RELATED LIVER DONOR *NR

Contrast:

- No oral contrast
- IV contrast at 4-5 mL/sec, hyperventilate patients prior to breath hold. Scans should be done in single breath for each phase.

Scan Method:

- Noncontrast: 5mm, 30 HS, top to bottom of liver
- Arterial: 2.5 mm 15 HS (smartprep aorta with threshold = 100 HU), top to bottom of liver.
Reconstruct at 1.25 mm intervals
- Portal venous phase – abdomen and pelvis – 70 sec post injection, 2.5 mm 15 HS through liver, 5 mm 30 HS through pelvis