

AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guideline ABDOMEN/PELVIS CT COMBO	Original Date: September 1997
CPT Codes: 74176, 74177, 74178	Last Revised Date: May 2020
Guideline Number: NIA_CG_068	Implementation Date: January 2021 TBD

GENERAL INFORMATION:

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. All prior relevant imaging results, and the reason that alternative imaging (gold standard, protocol, contrast, etc.) cannot be performed must be included in the documentation submitted.

INDICATIONS FOR ABDOMEN/PELVIS COMPUTED TOMOGRAPHY (CT):

This includes CTU (CT urography) and CTE (CT enterography).

For evaluation of suspected infection or inflammatory disease:

(ACR, 2013; Cartwright, 2015)

- Suspected diverticulitis or acute appendicitis for initial imaging along with **ONE** of the following (Linzay, 2018):
 - WBC Elevated
 - Fever
 - Anorexia
 - Nausea and vomiting
- Suspected appendicitis in a child (<age 18) (~~AAP/ACS; ACR, 2018;~~ Baker, 2020; ~~ACR, 2018;~~ AAP/ACS; Sanchez, 2016) when ultrasound is inconclusive or cannot be completed due to body habitus or inability to cooperate
- Use ultrasound or MRI in pregnant women with suspected appendicitis (ACR, 2018)
- For acute non-localized abdominal pain and fever, no recent surgery (ACR, 2018)
- For suspected retroperitoneal fibrosis after labs and inconclusive ultrasound (Runowska, 2016)

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For follow up evaluation of known infection or inflammatory disease:
(ACR, 2019; Cartwright, 2015)

- Complications of diverticulitis with severe abdominal/pelvic pain or severe tenderness or mass not responding to antibiotic treatment (prior imaging study is not required for diverticulitis diagnosis) (ACR, 2018; Cartwright, 2015, ~~ACR, 2018~~)
- Pancreatitis by history (including pancreatic pseudocyst) with continued abdominal pain, early satiety, nausea, vomiting or signs of infection greater than 4 weeks from initial presentation (ACR, 2019)
- Known inflammatory bowel disease, (Crohn's or Ulcerative colitis) with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy (ACR, 2019)
- Any known infection that is clinically suspected to have created an abscess in the abdomen and pelvis
- Any history of fistula that requires re-evaluation, or is suspected to have recurred in the abdomen and pelvis
- Abnormal fluid collection seen on prior imaging that needs follow-up evaluation
- Follow up for peritonitis (from any cause) if abdominal/pelvic pain and tenderness to palpation is present, and at LEAST ONE of the following:
 - Rebound, guarding, or rigid abdomen; OR
 - Severe tenderness to palpation present over entire abdomen
- For known retroperitoneal fibrosis to determine extent of disease

For evaluation of hematuria (includes CT urography (CTU)):
(ACR, 2019; Davis, 2012; Sharp, 2013)

- For hematuria (should be documented by greater than 3 red blood cells (RBC) per high-power field on urinalysis and not based on a dipstick test) (Davis, 2012)
- For ~~non-infectious~~ macroscopic or gross hematuria (~~non-infectious documented by urinalysis~~)

Suspected or known acute pancreatitis (ACR, 2019):

- For first time presentation with pain and abnormal amylase and lipase and < 48-72 hours, when ultrasound is inconclusive.
- Suspected acute pancreatitis with atypical signs and symptoms, and when a diagnosis other than pancreatitis may be possible.
- Known necrotizing pancreatitis.

For evaluation of a suspected or known hernia:

- Abdominal/pelvic pain suspected to be due to an occult, umbilical, Spigelian, incisional, hernia when physical exam or prior imaging is non-diagnostic or equivocal or if requested as a preoperative study.
- Hernia with suspected complications (e.g. bowel obstruction or strangulation) (Lassandro, 2011; Miller, 2014; Robinson, 2013)
- Complex ventral hernia that is $\geq \geq 10$ cm for pre-operative planning (Halligan, 2018)

Suspected inflammatory bowel disease (includes CT enterography)

- Suspected Crohn's disease) (consider MRE for patients under 35) with abdominal pain, chronic diarrhea, or bloody diarrhea, fatigue, or when there is a high clinical suspicion after complete work up including physical exam, labs, endoscopy with biopsy (ACR, 2019; Lichtenstein, 2018; ACR, 2019)
- For ulcerative colitis that is suspected clinically however abdominal symptoms are not explained by endoscopy (Rubin, 2019)
- For CT enterography (CTE) if a CT scan is inconclusive

For evaluation of known or suspected kidney or ureteral stones: (Choosing Wisely, 2018; Fontanelle, 2019; Moore, 2019)

- For patients <35 with a typical presentation and adequate pain relief, no imaging necessary.
- For acute renal colic in patients <55 and inadequate analgesia OR with an atypical presentation, OR with an abnormal or indeterminate ultrasound
- In patients with acute flank pain >age > 75
- In patients >55 with a prior history of stones and a typical presentation, no imaging (or ultrasound first).
- In middle aged patients (≥55) with no history of stones OR an atypical presentation, OR if ultrasound is inconclusive, non-diagnostic or shows an abnormality needing further evaluation, i.e., hydronephrosis or alternate diagnosis being considered.
- Pregnant and pediatric patients should have ultrasound as the initial imaging study if indicated (MRU preferred if further imaging indicated).
- For pre-operative planning related to percutaneous nephrolithotomy (PCNL), extracorporeal shock wave lithotripsy (SWL) or ureteroscopic procedure and no imaging has been done in the last 30 days, or if passage or movement of stones will change management (Assimos, 2016).
- For post-operative stone follow-up related to SWL or ureteroscopic procedures:
 - Symptomatic patients with known radiolucent stones
 - Symptomatic patients with radiopaque calculi, following a non-diagnostic KUB or ultrasound
- Asymptomatic patients with abnormal findings on another study (e.g., ie. hydronephrosis) (Fulgham, 2012)

Evaluation of suspicious or known mass/tumors:

- Initial evaluation of suspicious masses/tumors found by physical exam or imaging study such as ultrasound (US), and both the abdomen and pelvis are likely affected (ACR, 2013, 2014).
- New evidence of an unknown primary (Greco, 2012)
- Surveillance: One follow-up exam to ensure no suspicious change has occurred in a tumor in the abdomen and pelvis. No further surveillance CT unless tumor(s) are specified as highly suspicious or a change was found on the last follow-up CT, new/changing sign/symptoms or abnormal lab values.
- For abnormal incidental abdominopelvic lymph nodes when follow up is recommended based on prior imaging (initial 3 month FU) (Smereka, 2017)

- For follow up of mesenteric panniculitis (McLaughlin, 2013; Putte-Kaiser, 2014; Kaya, 2018) or lymphadenitis (Helbling, 2017) when another diagnosis is suspected after initial imaging or there is a failure of symptom resolution
- Prostate cancer when intermediate risk or greater, PSA levels ≥ 10 ng/mL, or biopsy Gleason Score ≥ 7 (Grade Group ≥ 2), or clinically advanced disease (T2b, T2c, T3, or T4) AND nomogram (e.g., Partin, Cancer of Prostate Risk Assessment CAPRA) indicating probability of lymph node involvement $> 10\%$) (NCCN, 2019; Reese, 2012; Tosian, 2017).

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Initial staging of known cancer

All cancers, excluding the following:

Basal Cell Carcinoma of the skin (NCCN, 2018)

Melanoma without symptoms or signs of metastasis (NCCN, 2018; Trotter, 2013)

Prostate cancer when intermediate risk or greater, PSA levels ≥ 10 ng/mL, or biopsy Gleason Score ≥ 7 (Grade Group ≥ 2), or clinically advanced disease (T2b, T2c, T3, or T4) AND nomogram (e.g., Partin, Cancer of Prostate Risk Assessment CAPRA) indicating probability of lymph node involvement $> 10\%$) (NCCN, 2019; Reese, 2012; Tosian, 2017).

- Follow up of known cancer (Bourgioti, 2016; NCCN, 2019)
- Follow up of known cancer of patient undergoing active treatment within the past year. For follow up recommendations go to: <https://www.nccn.org/professionals/imaging/content/>
- Known cancer with suspected abdominal/pelvic metastasis based on a sign, symptom or an abnormal lab value
- **Active monitoring for recurrence as clinically indicated**

For evaluation of hematuria (includes CT urography (CTU):

(ACR, 2019; Davis, 2012; Sharp, 2013)

- For hematuria (should be documented by greater than 3 red blood cells (RBC) per high-power field on urinalysis and not based on a dipstick test) (Davis, 2012)
- For macroscopic or gross hematuria (non-infectious documented by urinalysis)

For evaluation of known or suspected kidney or ureteral stones:

(ACEP, 2014; Brisbane, 2016; Choosing Wisely, 2018; Fontanelle, 2019; Moore, 2019)

For acute flank pain with hematuria (can be confirmed by dip stick)

For flank pain without hematuria with indeterminate or positive findings on other imaging

Known calculi in patients > 50 years of age

Known renal calculi in patients < 50 years of age after ultrasound has been obtained and is non-diagnostic, inconclusive, or shows an abnormality needing further evaluation (ACEP, 2014)

For patients < 35 with a typical presentation and adequate pain relief, no imaging necessary.

For acute renal colic in patients < 55 and inadequate analgesia OR with an atypical presentation, OR with an abnormal or indeterminate ultrasound

- In patients with acute flank pain >age 75

In patients >55 with a prior history of stones and a typical presentation, no imaging (or ultrasound first).

- In middle aged patients (>=55) with no history of stones OR an atypical presentation, OR if ultrasound is inconclusive, non-diagnostic or shows an abnormality needing further evaluation ie. hydronephrosis or alternate diagnosis being considered.

Pregnant and pediatric patients should have ultrasound as the initial imaging study if indicated (MRU preferred if further imaging indicated).

For pre-operative planning related to percutaneous nephrolithotomy (PCNL), extracorporeal shock wave lithotripsy (SWL) or ureteroscopic procedure and no imaging has been done in the last 30 days, or if passage or movement of stones will change management (Assimos, 2016).

- For post-operative stone follow-up related to SWL or ureteroscopic procedures:

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Symptomatic patients with known radiolucent stones

Symptomatic patients with radiopaque calculi, following a non-diagnostic KUB or ultrasound

- Asymptomatic patients with abnormal findings on another study (ie. hydronephrosis) (Fulgham, 2012)

For evaluation of pyelonephritis in the following situations:

- When other imaging such as ultrasound is abnormal
- For a patient who remains febrile after 72 hours of treatment (Bonkat, 2017) or symptoms resolve and then recur within 2 weeks (Grabe, 2015)
- For a complicated patient with history of diabetes, stone disease or prior urinary tract surgery, or who is immunocompromised and is not responding to treatment (ACR, 2018).

For evaluation of Recurrent Urinary tract Infections in women (defined as at least 3 episodes of uncomplicated infection in the past twelve months) (Tononlini, 2016; Seminerio, 2011):

- When there is suspicion of renal calculi or outflow obstruction (Anger 2019; Bonkat 2017)
- Suspect an anatomic abnormality based on prior imaging (i.e., Cystocele, diverticulum, congenital anomaly) (Dason, 2011)
- For recurrent lower urinary tract infections in a female who are non-responders to conventional therapy or have known underlying risk factors (ACR, 2020)
- For evaluation of a non-diagnostic ultrasound with hydronephrosis
- Men with UTI symptoms
 - ≥ age 60, initial infection (Schaeffer, 2016)
 - < age 60 with two or more infections

~~For evaluation of suspected infection or inflammatory disease: (ACR, 2013; Cartwright, 2015)~~

- ~~• Suspected diverticulitis or acute appendicitis for initial imaging along with ONE of the following (Linzay, 2018):~~

~~○ WBC Elevated~~

~~• Fever~~

~~• Anorexia~~

~~• Nausea and vomiting~~

~~• Suspected appendicitis in a child (<age 18) (Baker, 2020; ACR, 2018; AAP/ACS; Sanchez, 2016) when ultrasound is inconclusive or cannot be completed due to body habitus or inability to cooperate~~

~~• Use ultrasound or MRI in pregnant women with suspected appendicitis (ACR, 2018)~~

~~• For acute non-localized abdominal pain and fever, no recent surgery (ACR, 2018)~~

~~• For suspected retroperitoneal fibrosis after labs and inconclusive ultrasound (Runowska, 2016)~~

Suspected or known acute pancreatitis (ACR, 2019):

~~For first time presentation with pain and abnormal amylase and lipase and < 48-72 hours, when ultrasound is inconclusive.~~

~~Suspected acute pancreatitis with atypical signs and symptoms, and when a diagnosis other than pancreatitis may be possible.~~

~~Known necrotizing pancreatitis.~~

Suspected inflammatory bowel disease (includes CT enterography)

~~Suspected inflammatory bowel disease (Crohn's disease or ulcerative colitis) (consider MRE for patients under 35) with abdominal pain, chronic diarrhea, or bloody diarrhea, fatigue, or when there is a high clinical suspicion after complete work up including physical exam, labs, endoscopy with biopsy (Lichtenstein, 2018, ACR, 2019)~~

~~For ulcerative colitis that is suspected clinically however abdominal symptoms are not explained by endoscopy (Rubin, 2019)~~

~~For CT enterography (CTE) if a CT scan is inconclusive~~

Suspected small bowel obstruction when there is a strong clinical suspicion:

- Crampy pain, vomiting, distention, high pitched or absent bowel sounds, prior history of abdominal surgery or based on initial radiograph (ACR, 2019⁹³; Paulson, 2015)

Suspected peritonitis (from any cause) if abdominal pain and tenderness to palpation is present, and at LEAST ONE of the following:

- Rebound, guarding (not voluntary) or rigid abdomen, **OR**
- Severe tenderness to palpation present over entire abdomen
-

Evaluation of suspicious or known mass/tumors:

- Initial evaluation of suspicious masses/tumors found by physical exam or imaging study such as ultrasound (US), and both the abdomen and pelvis are likely affected (ACR, 2013, 2014).
- New evidence of an unknown primary (Greco, 2012)
- Surveillance: One follow-up exam to ensure no suspicious change has occurred in a tumor in the abdomen and pelvis. No further surveillance CT unless tumor(s) are specified as highly suspicious

or a change was found on the last follow-up CT, new/changing sign/symptoms or abnormal lab values.

- For abnormal incidental abdominopelvic lymph nodes when follow up is recommended based on prior imaging (initial 3 month FU) (Smereka, 2017)
- For follow up of mesenteric panniculitis (McLaughlin, 2013; Putte-Kaiser, 2014; Kaya, 2018) or lymphadenitis (Helbling, 2017) when another diagnosis is suspected after initial imaging or there is a failure of symptom resolution
- Prostate cancer when intermediate risk or greater, PSA levels ≥ 10 ng/mL, or biopsy Gleason Score ≥ 7 (Grade Group ≥ 2), or clinically advanced disease (T2b, T2c, T3, or T4) AND nomogram (e.g., Partin, Cancer of Prostate Risk Assessment CAPRA) indicating probability of lymph node involvement $>10\%$) (NCCN, 2019; Reese, 2012; Tosian, 2017).
- Follow-up of known cancer (Bourgioti, 2016; NCCN, 2019b)
 - Follow-up of known cancer of patient undergoing active treatment within the past year
 - Known cancer with suspected abdominal/pelvic metastasis based on a sign, symptom or an abnormal lab value

Suspected colonic or mesenteric ischemia (Dhatt, 2015) CTA also appropriate (ACR, 2018)

For suspected small bowel bleeding when endoscopy and capsule endoscopy are inconclusive or negative (Pasha, 2017)

For follow up evaluation of known infection or inflammatory disease:
(ACR, 2019; Cartwright, 2015)

- ~~Complications of diverticulitis with severe abdominal/pelvic pain or severe tenderness or mass not responding to antibiotic treatment (prior imaging study is not required for diverticulitis diagnosis) (Cartwright, 2015, ACR, 2018)~~
- ~~Pancreatitis by history (including pancreatic pseudocyst) with continued abdominal pain, early satiety, nausea, vomiting or signs of infection greater than 4 weeks from initial presentation (ACR, 2019)~~
- ~~Known inflammatory bowel disease, (Crohn's or Ulcerative colitis) with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy (ACR, 2019)~~
- ~~Any known infection that is clinically suspected to have created an abscess in the abdomen and pelvis~~
- ~~Any history of fistula that requires re-evaluation, or is suspected to have recurred in the abdomen and pelvis~~
- ~~Abnormal fluid collection seen on prior imaging that needs follow up evaluation~~
- ~~Follow up for peritonitis (from any cause) if abdominal/pelvic pain and tenderness to palpation is present, and at LEAST ONE of the following:~~
 - ~~Rebound, guarding, or rigid abdomen; OR~~
 - ~~Severe tenderness to palpation present over entire abdomen~~

~~For known retroperitoneal fibrosis to determine extent of disease~~

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~~For known retroperitoneal fibrosis to determine extent of disease~~

For evaluation of known or suspected aortic aneurysm - CTA or MRA are the gold standards and preferred after ultrasound (ACR, 2018; Kumar, 2017) has been completed, however CT also approvable (Chaikof, 2018):

- Known or suspected aneurysm > 2.5 cm **AND** equivocal or indeterminate ultrasound results
- Suspected complications of known aneurysm as evidenced by signs/symptoms such as new onset of abdominal or pelvic pain
- Scheduled follow-up evaluation of aorto/iliac endograft or stent (Abd/Pelvic CTA preferred)
- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism and intimal hyperplasia.
- Evaluation of post-operative complications, e.g. pseudoaneurysms, related to surgical bypass grafts, vascular stents and stent-grafts in the peritoneal cavity.
- Follow-up for post-endovascular repair (EVAR) or open repair of abdominal aortic aneurysm (AAA) or abdominal extent of iliac artery aneurysms. Routine, baseline study (post-op/intervention) is warranted within 1-3 months (Chaikof, 2018; Uberoi, 2011).
 - Asymptomatic at six (6) month intervals, for one (1) year, then annually.
 - Symptomatic/complications related to stent graft – more frequent imaging may be needed.
- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

For evaluation of trauma:

(ACR, 2012)

- Suspected retroperitoneal hematoma or hemorrhage based on lab or physical findings
- Blunt injury with suspicion of multisystem trauma and hematuria
- Penetrating abdominal injury with suspicion of multisystem trauma with or without hematuria (ACR, 2012)

For evaluation of a suspected or known hernia:

- ~~Abdominal/pelvic pain suspected to be due to an occult, umbilical, Spigelian, incisional, hernia when physical exam or prior imaging is non-diagnostic or equivocal or if requested as a preoperative study.~~
- ~~Hernia with suspected complications (e.g. bowel obstruction or strangulation) (Lassandro, 2011; Miller, 2014; Robinson, 2013)~~
- ~~Complex ventral hernia that is ≥ 10 cm for pre-operative planning (Halligan, 2018)~~

Pre-operative evaluation:

- For abdominal/pelvic surgery or procedure

Post-operative/procedural evaluation:

- Follow-up of known or suspected post-operative complication

- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed.

Other Indications for Abdomen/Pelvic CT Combo:

- Persistent abdomen/pelvic pain not explained by previous imaging/procedure
- To locate a pheochromocytoma once there is clear biochemical evidence
- For B symptoms of fevers to more than 101° F, drenching night sweats, and unexplained weight loss of more than 10% of body weight over 6 months, if CXR, labs and an ultrasound of the abdomen and pelvis have been completed (can also approve chest CT) (Cheson, 2014).
- Unexplained weight loss of 10% of body weight in two months (patient history is acceptable); with a second MD visit documenting some further decline in weight (Gaddey, 2014).
- Unexplained weight loss of 5% of body weight in six months confirmed by documentation to include the following (Bosch, 2017; Wong, 2014):
 - Related history and abdominal exam
 - Chest x-ray
 - Abdominal ultrasound
 - Lab tests, must include TSH
 - Colonoscopy if patient fifty plus (50+) years old
- Acute abdominal pain in patients sixty-five (65) years or older (ACR, 2018; Lehtimäki, 2016)
- In the work up of a paraneoplastic syndrome after ultrasound, mammography and appropriate lab tests are completed.
- To screen all adult patients with dermatomyositis to rule out occult malignancy (Titulaer, 2011; Dalakis, 2015; Chen, 2010; Dalakis, 2015; Titulaer, 2011)
- For diffuse, unexplained lower extremity edema with negative or inconclusive ultrasound (Hoshino, 2016)
- For elevation of carcinoembryonic antigen (CEA) in a patient with no cancer history after complete clinical work up (including organ specific investigations such as colonoscopy, gastroscopy, mammography, cystoscopy, ultrasound) that fails to demonstrate a reason and CEA is >10 ng/ml, or fails to drop below 5 ng/ml after 3-6 months intervals (see comment section).
- For fever of unknown origin (temperature of ≥ 101 degrees for a minimum of 3 weeks) after standard diagnostic tests are negative (see comment section) (Brown, 2019)
- For evaluation of suspected May-Thurner syndrome (CTV/MRV preferred) (Ibrahim, 2012; Wan-Ling, 2012)
- For further evaluation of an isolated right varicocele with additional signs and symptoms that suggest malignancy or suspicious prior imaging (Gleason, 2019)

Indication for combination studies for the initial pre-therapy staging of cancer, OR active monitoring for recurrence as clinically indicated OR evaluation of suspected metastases:

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine, or Lumbar Spine

BACKGROUND:

CT provides direct visualization of anatomic structures in the abdomen and pelvis and is a fast imaging tool used to detect and characterize disease involving the abdomen and pelvis. Abdomen/pelvis imaging begins at the diaphragmatic dome through pubic symphysis. CT uses x-rays and multiple detectors to create cross sectional images of the normal anatomy as well as demonstrate abnormal soft tissue densities, calcifications or fluid/gas patterns in the viscera or peritoneal space.

In general, ionizing radiation from CT should be avoided during pregnancy. Ultrasound is clearly a safer imaging option and is the first imaging test of choice, followed by MRI in appropriate situations. Clinicians should exercise increased caution with CT imaging in children, pregnant women, and young adults due to the risks of exposure to ionizing radiation. Screening for pregnancy as part of a work-up is suggested to minimize the number of unexpected radiation exposures for women of childbearing age.

OVERVIEW:

CT Imaging for renal colic and hematuria: There are over 2 million annual emergency visits for suspected renal colic in the -US and CT is performed in over 90% of patients diagnosed with kidney stones (Moore, 2019). Evidence now supports ultrasound or no further imaging in specific clinical scenarios as renal colic is often self limited. CT can guide therapy in a subset of patients who require intervention or who have other conditions that mimic renal colic i.e., appendicitis. CT protocols include: “stone protocol” for detecting urinary tract calculi, “renal mass protocol” for characterizing known renal masses, and CT urography for evaluating hematuria. Non-contrast CT can be used for detecting most ureteral and renal stones but sometimes an intravenous contrast agent is needed to determine the relationship of the calculus to the opacified ureter. ~~CT is an effective imaging examination for diagnosing hematuria caused by urinary tract calculi, renal tumors and urothelial tumors.~~

CT imaging for recurrent urinary tract infections: Imaging in patients without risk factors and less than two infections a year on average and who respond promptly to therapy, is of low yield. Risk factors include but not limited to: Infection with urea-splitting organism, previous pyelonephritis, history of calculi or obstruction, obstructive symptoms, elevated creatinine, severe diabetes, childhood UTI, neurogenic bladder dysfunction, history of GU surgery, suspected bladder diverticula or urethral, urinary incontinence, pelvic floor dysfunction, post void residual (ACR, 2020).

CT Imaging for abdominal aortic aneurysms: If a pulsatile abdominal mass is found in an asymptomatic patient, abdominal ultrasonography is an inexpensive and noninvasive technique for initial evaluation. For further examination, CT may be performed to better define the shape and extent of the aneurysm and the local anatomic relationships of the visceral and renal vessels. CT has high level of accuracy in sizing aneurysms. CTA and MRA are the gold standards for imaging. The majority of evidence regarding AAA surveillance using CT is based on CTA data and is primarily related to contrast

bolus timing. Contrast-enhanced CT is well established in the literature and is capable of identifying aortic aneurysms, with many papers discussing incidental AAA identification (ACR 2018). Risk of rupture in 6 years for an AAA < 4 cm is 1%. For a 4-5 cm AAA the risk of rupture increases to 1-3% per year and becomes 6-11% per year for AAA 5-7 cm in cross sectional diameter. For >7 cm the risk of rupture goes to 7% per year.

****Abdominal aneurysms and general guidelines for follow-up:**

The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilatation of the infrarenal aorta is defined as diameter ≥ 3.0 cm or dilatation of the aorta ≥ 1.5 x the normal diameter. Initial evaluation of AAA is accurately made by ultrasound. Ultrasound can detect and size AAA, with the advantage of being relatively inexpensive, noninvasive and not require iodinate contrast. The limitations are that overlying bowel gas can obscure findings and the technique is operator dependent.

Recommended intervals for initial follow-up imaging (any modality) of ectatic aortas and abdominal aortas (follow up intervals may vary depending on comorbidities and the growth rate of the aneurysm):

2.5-2.9 cm:5yr
3.0-3.4 cm: 3yr
3.5-3.9 cm:2yr
4.0-4.4 cm:1yr
4.5-4.9 cm:6 mo
5.0-5.5 cm:3-6 mo

The Society of Vascular Surgery has different follow up intervals for AAA (SVS, 2018):

>2.5 cm - <3 cm.....10 yr
3.0 - 3.9 cm.....3 yr
4.0 - 4.9 cm.....12 mo
5.0 - 5.4 cm.....6 mo.

The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk (Chaikof, 2018).

CT for Mesenteric Ischemia

CT of the abdomen and pelvis with intravenous (IV) contrast performed during the venous phase has been less well studied compared with CTA in diagnosing mesenteric ischemia. CT with IV contrast can assess nonvascular findings, major arterial lesions, and mesenteric veins; however, the lack of arterial phase may lead to suboptimal evaluation of the mesenteric arteries compared to CTA (ACR AUC 2018).

CT for elevation of CEA with no history of a previous CEA-producing tumor:

CEA is not normally elevated after birth, but when elevated increases the chance of finding colon cancer from 1.3% to 4.6%. It is also a predictor of other diseases including other cancers (e.g., ie,

Mucinous adenocarcinomas of the endocervix and ovary, as well as keratinising squamous cell carcinoma of the cervix), diabetes, chronic lung and liver disease.

Evaluation should begin with a thorough history and clinical exam, and smoking history.

Investigation would include repeat CEA, full blood count, and iron, liver function and renal function tests, CA 125 levels and calcitonin. If CEA <10ng/ml and clinical review is negative, repeat the clinical evaluation in 3 months and CEA for changes. If level falls repeat at 6 month intervals until normal or 2 consecutive decreases. If CEA level remains above 5 ng/ml after 3-6 month intervals or exceeds 10ng/ml at any stage, consider CT imaging (Hall, 2019).

~~Consider the role of capsule endoscopy—Retrospective comparison of capsule endoscopy (CE) to CT in patients with no evidence of a small bowel stricture at barium examination was the focus of the article by Hara, et al. Studies were done for bleeding of unknown origin after colonoscopy and/or Gastroenterologist, inflammatory bowel disease or chronic abdominal pain. CE was found to be more sensitive than CT examination in the 19 patients that underwent both. CE provides a complimentary and sensitive approach to the evaluation of the small bowel without radiation exposure. A negative examination does not completely rule out pathology.~~

CT and Fever of Unknown Origin:

Initial work up prior to CT would include a comprehensive history, repeated physical exam, complete blood count with differential, three sets of blood cultures, chest x-ray, complete metabolic panel, urinalysis, ESR, ANA, RA, CMV IgM antibodies, Virus detection in blood, heterophile antibody test, tuberculin test, HIV antibody test (Brown, 2019)

CT and screening for occult malignancy- In patients with a dermatomyositis, an initial screen with CT chest and abdomen recommended large population based cohort studies report a frequency of 20-25% of malignancy). For the first incidence of unprovoked DVT, there is no indication for screening for occult malignancy (history, blood testing including blood count, calcium, UA, liver function tests), CXR, and age and gender specific screening indicated) (Carrier, 2015). In the case of recurrent DVT, recently a risk score including age >70, chronic lung disease, anemia, elevated platelet count, prior venous thrombosis and recent surgery was designed but still needs external validation before clinical use (Jara-Palomares, 2017; Fernandes, 2019). Paraneoplastic neurologic syndromes fall into this category. They are rare, often sub acutely manifesting conditions associated with malignant neoplasms and are hypothesized to be immune mediated. When classic clinical symptoms are present and a high concentration of characteristic anti neuronal antibodies, there is associated a high probability of malignancy. Small cell lung cancer, thymoma, breast cancer, ovarian cancer and teratoma and testicular tumors are most common. In paraneoplastic syndrome screen first for breast cancer with mammography then MRI breast, ovarian teratoma and ovarian cancer with pelvic ultrasound (also CA-125), and for a testicular tumor with ultrasound (also B-HCG and AFP), and if inconclusive follow by CT. Note that tumors may manifest as late as 5 years after the onset of PNS symptoms and further follow up imaging may be warranted (Sundermann, 2017).

Combination request of Abdomen CT/Chest CT - A Chest CT will produce images to the level of L3. Documentation for combo is required.

Evaluation for appendicitis following clinical and laboratory evaluation -

Sonography of the right upper quadrant and pelvis followed by graded compression and color Doppler sonography of the right lower quadrant was used by Gaitini and colleagues as the initial imaging study in 420 consecutive patients referred for emergency evaluation of acute appendicitis. This method correctly diagnosed acute appendicitis in 66 of 75 patients (88%) and excluded it correctly in 312 of 326 patients (96%). It was inconclusive in 19 patients (<5%). Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 74.2%, 97%, 88%, 93%, and 92%, respectively and comparable to CT.

Appropriate and timely diagnosis of acute appendicitis is needed. Negative laparotomy rates can range from 16% to 47% when based on clinical and laboratory data alone, while perforation rate can reach 35% when surgery is delayed. Appropriate initial imaging can lower the negative laparotomy rate to 6-10%. Ultrasound has a higher non-diagnostic rate (4%) vs. 0.8% for MDCT. In a prospective study operator experience and patient BMI did not affect diagnostic accuracy.

Consider alternatives to CT imaging in patients with Crohn disease: In facilities where the technical and clinical expertise exists, MR enterography is emerging as the study of choice (replacing CT) for patients requiring frequent follow up examinations to determine disease extent or progression. The technique also allows evaluation of extramucosal and extraluminal disease.

Consider the role of capsule endoscopy - Small bowel capsule endoscopy allows for direct visualization of the mucosa of the small intestine and has been found to be superior to barium studies, CTE and ileocolonoscopy. However, the specificity has been questioned. There is a high negative predictive value of 96%. Also, it may identify a site for selected biopsy to establish a diagnosis.

Lab tests used in diagnosing IBD- Anti-glycan antibodies are more prevalent in CD than UC, but have a low sensitivity. Fecal calprotectin is helpful test which can help differentiate IBD from irritable bowel syndrome, as well as in assessment of disease activity, monitoring disease including response to therapy. Data supports the use of fecal calprotectin to predict relapse in CD. Those who relapsed in one year had significantly higher levels at baseline.

Fecal lactoferrin and fecal PMN-elastase also used for monitoring disease activity in Crohn's. (Cappello, 2016).

Initial evaluation of abdominal aortic aneurysm (AAA) - Initial evaluation of AAA is accurately made by ultrasound.

Imaging of hernias: Most hernias are diagnosed clinically with imaging recommended for the diagnosis of occult hernias or in the evaluation of hernia complications, such as bowel obstruction or strangulation. To detect occult hernias, ultrasound is a first line study with a sensitivity of 86% and specificity of 77%, compared to 80% sensitivity and 65% specificity for CT (Robinson, 2013). According to Miller, et al "Magnetic resonance imaging is generally not considered a first- or even second-line evaluation modality for hernias..." (Miller, 2014). Based on this analysis, MRI is recommended only when ultrasound and CT have been performed and fail to make a diagnosis.

POLICY HISTORY:

Review Date: -May, -2019

Review Summary:

- For hematuria, clarified that testing should not be done by dipstick; for infectious hematuria, removed restriction of 6 week completion of antibiotic therapy
- Modified indication for prostate cancer imaging when PSA levels ≥ 10 ng/mL per NCCN update
- Removed indication for evaluation of organ enlargement; suspected cholecystitis or retained gallstones; hepatitis screening; adrenal mass; ischemic bowel; suspected partial small bowel obstruction
- Added indications for known necrotizing pancreatitis; acute flank pain with or without hematuria; pregnant women with suspected appendicitis consider US or MRI; blunt injury or penetrating abdominal injury; evaluation of endovascular/interventional abdominal vascular procedures; follow up for post endovascular repair or open repair of abdominal aortic aneurysm; symptoms of fevers, night sweats, unexplained weight loss over 6 months if CXR, labs, and US have been performed
- Added time frame to Pancreatitis history to include >4 weeks of symptoms

Review Date: May 2020

Review Summary:

- Added indication for imaging of new evidence of an unknown primary
- FU for abnormal lymph nodes at 3 months
- FU mesenteric panniculitis if symptoms fail to improve
- Renal colic added no imaging if under 35 and adequate pain relief; if <55 and inadequate relief or abnormal US can image, >55 if no hx of stones or abnormal ultrasound
- Pre op for renal surgery or procedure
- Post op for symptomatic patients or asymptomatic and abnormal ultrasound
- Added imaging for pyelonephritis with complex med hx such as diabetes or prior urinary tract surgery or immunocompromised
- Added GL for men with UTI based on age <or>60
- Improved criteria for WU of IBD, added CTE information and imaging for monitoring therapy
- Other indications added—for diffuse LE edema with neg or inconclusive US; elevated CEA with no cancer hx, FUO; May-Thurner; isolated right varicocele; Paraneoplastic syndrome; dermatomyositis; acute pain in patient over 65
- Added to comment section on renal colic, recurrent UTI, CEA; Occult malignancy

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