

EMERGENCY CROSS-SECTIONAL IMAGING

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Acute Flank Pain Secondary to Urolithiasis: Radiologic Evaluation and Alternate Diagnoses **395**

Gaurav Jindal and Parvati Ramchandani

This article discusses the radiologic management of the patient who has acute flank pain. It describes the evolution of radiologic imaging in patients who present with acute symptoms caused by suspected urolithiasis, the advantages of unenhanced helical CT and the limitations of abdominal radiography, intravenous urography, and ultrasonography in this setting, and the alternative diagnoses encountered within the urinary tract, abdomen, and pelvis.

Current Concepts in Imaging of Appendicitis **411**

Alexander V. Rybkin and Ruedi F. Thoeni

Appendicitis is the most common cause of acute abdominal pain requiring surgery. Early diagnosis is crucial to the success of therapy. CT and ultrasound are widely recognized as very useful in the timely diagnosis of appendicitis. MR imaging is emerging as an alternative to CT in pregnant patients and in patients who have an allergy to iodinated contrast material. This article reviews the current imaging methods and diagnostic features of appendicitis.

Computer Tomography for Venous Thromboembolic Disease **423**

Wael E.A. Saad and Nael Saad

Venous thromboembolic disease is composed of two disease entities: pulmonary thromboembolism/pulmonary embolism and deep venous thrombosis. Clinical signs and symptoms of venous thromboembolic disease often are nonspecific and, as a result, the diagnosis may be difficult. If left untreated, pulmonary embolism can lead to a potentially fatal outcome. This article focuses on CT angiography as the diagnostic modality for thromboembolic pulmonary embolism and briefly discusses non-thromboembolic pulmonary embolism.

Cross-Sectional Imaging in Acute Pancreatitis**447***Anuradha Saokar, Chad B. Rabinowitz, and Dushyant V. Sahani*

Acute pancreatitis is a common disease with potentially serious outcomes. Multiple imaging modalities can be used to evaluate the disease process and its associated complications. Familiarity with the pathogenesis of this disease, indications for imaging, imaging protocols, staging systems, and the strengths and weaknesses of various modalities will help the radiologist optimize patient care.

Review of CT Angiography of Aorta**461***Tongfu Yu, Xiaomei Zhu, Lijun Tang, Dehang Wang, and Nael Saad*

The most common imaging modality used for diagnosis of aortic disease is CT, followed by transesophageal echocardiography, MRI, and aortography. If multiple imaging is performed, the initial imaging technique most frequently employed is computerized tomography. During the past decade, computed tomographic angiography (CTA) has become a standard non-invasive imaging modality for the depiction of vascular anatomy and pathology. The quality and speed of CTA examinations have increased dramatically as CT technology has evolved from-channel spiral CT systems to multichannel (4-, 8-, 10- and 16-slice) spiral CT system. The quality and speed of CTA is superior to other imaging modalities, and it is also cheaper and less invasive. CTA of the aorta has proven to be superior in diagnostic accuracy to conventional arteriography in several applications.

MR Imaging of the Aorta**485***Ichiro Sakamoto, Eijun Sueyoshi, and Masataka Uetani*

Recent advances in noninvasive imaging methods, such as CT and MR imaging, have replaced most of invasive angiographic procedures in the diagnosis of acquired aortic disease, decreasing the cost and morbidity of diagnosis. This article reviews and illustrates present MR imaging methods for evaluation of the aorta. Common diseases of the aorta also are discussed with a focus on their unique morphologic and functional features and characteristic MR imaging findings. Knowledge of pathologic conditions of common aortic diseases and proper MR imaging techniques enables accurate and time-efficient aortic evaluation.

Multidetector Row CT of Small Bowel Obstruction**499***Adnan Qalbani, David Paushter, and Abraham H. Dachman*

State-of-the-art multidetector row CT (MDCT) technology has revolutionized abdominal imaging. The ability of CT to determine if bowel obstruction is present, to localize the obstructive site, to determine degree of obstruction, to diagnose the presence of closed-loop obstruction, and to identify ischemia or perforation of the involved bowel is well established. This article illustrates the usefulness of MDCT in the evaluation of small bowel obstruction and related conditions in adults and emphasizes the benefits of advanced CT applications.

Upper Extremity Venous Doppler Ultrasound**513***Therese M. Weber, Mark E. Lockhart, and Michelle L. Robbin*

Ultrasound is the initial imaging modality of choice when evaluating the upper extremity venous system. When sonographic findings are equivocal or nondiagnostic,

particularly in evaluating the central deep veins, MR venography or catheter venography correlation may be helpful. Ultrasound provides an accurate, rapid, low-cost, portable, noninvasive method for screening, mapping, and surveillance of the upper extremity venous system.

Ultrasound Evaluation of the Lower Extremity Veins

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Ulrike M. Hamper, M. Robert DeJong, and Leslie M. Scutt

Over the past 2 decades venous ultrasonography has become the standard primary imaging technique for the initial evaluation of patients for whom there is clinical suspicion of deep venous thrombosis (DVT) of the lower extremity veins. This article addresses the role of duplex ultrasonography and color Doppler ultrasonography in today's clinical practice for the evaluation of patients suspected of harboring a thrombus in their lower extremity veins. It reviews the clinical presentation and differential diagnoses, technique, and diagnostic criteria for acute and chronic DVT. In addition, it addresses the sonographic evaluation of venous insufficiency.

Sonographic Evaluation of Ectopic Pregnancy

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Shweta Bhatt, Hamad Ghazale, and Vikram S. Dogra

Ectopic pregnancy is a high-risk condition that occurs in 1.9% of reported pregnancies. Although the clinical triad of pain, bleeding, and amenorrhea is considered very specific for an ectopic pregnancy, ultrasound plays important role in detecting the exact location of the ectopic pregnancy and also in providing guidance for minimally invasive treatment. This article discusses the main sonographic features of ectopic pregnancy at various common and unusual locations. In addition, it provides insight into the role of hormonal markers in the diagnosis and management of ectopic pregnancy.

Occult Fractures of Extremities

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Joong Mo Ahn and Georges Y. El-Khoury

Recent advances in cross-sectional imaging, particularly in CT and MR imaging, have given these modalities a prominent role in the diagnosis of fractures of the extremities. This article describes the clinical application and imaging features of cross-sectional imaging (CT and MR imaging) in the evaluation of patients who have occult fractures of the extremities. Although CT or MR imaging is not typically required for evaluation of acute fractures, these modalities could be helpful in the evaluation of the occult osseous injuries in which radiographic findings are equivocal or inconclusive.

Renal Trauma

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Young Joon Lee, Soon Nam Oh, Sung Eun Rha, and Jae Young Byun

Urinary tract injury occurs in 10% of all abdominal trauma patients, and the kidney is the most commonly injured organ in the urinary tract. CT with contrast enhancement is the modality of choice for cross-sectional imaging of renal trauma because it quickly and accurately can demonstrate injury to the renal parenchyma, renal pedicles, and associated abdominal or retroperitoneal organs. This article reviews the mechanism, clinical features, imaging modalities, and CT imaging findings according to the classification of the renal trauma. Trauma to underlying abnormal kidneys, iatrogenic renal injuries, and complications of renal trauma are reviewed also.

Mesenteric Ischemia**593***Angela D. Levy*

Mesenteric ischemia is a difficult clinical diagnosis that requires a high index of clinical suspicion because the clinical and imaging features of intestinal ischemia and infarction overlap with many other intestinal disorders, and patients who have mesenteric ischemia often have coexisting diseases. Multidetector CT (MDCT) evaluation of the abdomen is the examination of choice when mesenteric ischemia is suspected because of its ability to provide two-dimensional multiplanar and three-dimensional display of the mesenteric vasculature and small intestine. This article reviews the clinical features, pathophysiology, and MDCT features of mesenteric ischemia.

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