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Gregory R. Lisciandro and Jennifer M. Gambino

Section I: Respiratory

Lung Ultrasound Fundamentals, “Wet Versus Dry” Lung, Signs of Consolidation in Dogs and Cats 1125

Gregory R. Lisciandro and Stephanie C. Lisciandro

 Video content accompanies this article at <http://www.vetsmall.theclinics.com>.

Vet BLUE, a standardized and validated rapid lung ultrasound examination, includes 9 acoustic windows: 4 transthoracic bilaterally applied named Caudodorsal, Perihilar, Middle, and Cranial Lung Regions plus the Diaphragmatico-Hepatic view of AFAST/TFAST. Moreover, Vet BLUE has a B-line scoring system (weak positives—1, 2, and 3 and strong positives—>3 and infinite) that semiquantitate degree of alveolar-interstitial syndrome and a visual lung language for signs of consolidation (Shred Sign [air bronchogram], Tissue Sign [hepatization], Nodule Sign, and Wedge Sign [pulmonary infarction]). Using its regional, pattern-based approach, a respiratory working diagnosis may be rapidly developed point-of-care and followed serially.


Lung Ultrasound for Pulmonary Contusions 1141

Samuel A. Dicker

Lung ultrasound (LUS) has high sensitivity for the rapid and reliable diagnosis of pulmonary contusions (PC) in patients who have sustained trauma. LUS diagnosis of PC exceeds that of thoracic radiographs in multiple animal and human studies. The sonographer should understand potential caveats and confounding variables for proper diagnosis of PC with LUS. LUS does not replace conventional radiography or computed tomography, especially in the polytrauma patient. LUS should be used concurrently with other point-of-care ultrasound trauma protocols to rapidly optimize patient assessment before movement to the radiology suite.

Lung Ultrasonography for Pneumothorax in Dogs and Cats 1153

Søren R. Boysen

 Video content accompanies this article at <http://www.vetsmall.theclinics.com>.

A sonographic diagnosis of pneumothorax (PTX) traditionally relies on excluding the presence of lung sliding, lung pulse, and/or B lines/lung consolidations, and identifying the lung point. However, these criteria can be difficult to identify, particularly in critically ill patients with respiratory disorders, and the lung point is infrequently used. Newer sonographic findings,


such as mirrored ribs, reverse lung sliding, and abnormal curtain signs, have been identified to try to increase the accuracy of diagnosing PTX. This article describes and discusses the lung ultrasonography criteria used to diagnose PTX in both human and small animal patients.

Section II: Non-pulmonary Thoracic and Cardiac Ultrasound

TFAST Accurate Diagnosis of Pleural and Pericardial Effusion, Caudal Vena Cava in Dogs and Cats

1169

Gregory R. Lisciandro


 Video content accompanies this article at <http://www.vetsmall.theclinics.com>.

TFAST, a standardized and validated thoracic point-of-care ultrasound examination, includes 5 acoustic windows: bilaterally applied chest tube site and pericardial site views plus diaphragmatico-hepatic view, also part of AFAST/ Vet BLUE. TFAST is used for rapid detection of pneumothorax and pleural and pericardial effusion. By following a set of TFAST rules, image interpretation errors are avoided, including mistaking cardiac chambers for effusion. Moreover, TFAST echocardiography is used as a screening test for chamber size and soft tissue abnormalities, volume status and contractility, and intracardiac abnormalities.

Focused Cardiac Ultrasonography in Cats

1183

Kerry Loughran

 Video content accompanies this article at <http://www.vetsmall.theclinics.com>.

Heart disease is a common cause of morbidity and mortality in cats. Focused cardiac ultrasonography (FCU) is a useful diagnostic tool for identifying heart disease in symptomatic and asymptomatic cats when performed by trained veterinarians. When used in conjunction with other diagnostics such as physical examination, blood biomarkers, electrocardiography, Global FAST, and other point-of-care ultrasonographic examinations, FCU may improve clinical decision making and help clinicians prioritize which cats would benefit from referral for complete echocardiography and cardiac consultation. This article reviews the definition, advantages, clinical indications, limitations, training recommendations, and a protocol for FCU in cats.

Focused Canine Cardiac Ultrasound

1203


Teresa C. DeFrancesco and Jessica L. Ward

Focused cardiac ultrasound (FCU) is a useful point-of-care imaging tool to assess cardiovascular status in symptomatic dogs in the acute care setting. Unlike complete echocardiography, FCU is a time-sensitive examination involving a subset of targeted ultrasound views to identify severe cardiac abnormalities and is performed as part of an integrated thoracic ultrasound including interrogation of the pleural space and lungs. When integrated with other clinical information, FCU can be helpful in the diagnosis of left-sided and right-sided congestive heart failure, pericardial effusion and tamponade, and severe pulmonary hypertension, and can provide estimates of fluid responsiveness in hypotensive dogs.

Section III: Focused Ultrasound of the Abdomen**AFAST Target-Organ Approach and Fluid Scoring System in Dogs and Cats**

1217

Gregory R. Lisciandro


 Video content accompanies this article at <http://www.vetsmall.theclinics.com>.

Point-of-care ultrasonography as part of the physical examination is becoming considered a core skill. AFAST includes 5 acoustic windows over the abdomen and serves as a rapid screening test for free fluid (ascites, retroperitoneal, pleural and pericardial effusion) and soft tissue abnormalities (target-organ approach), and has an abdominal fluid scoring system (semiquantitating volume). Moreover, add-on skills are possible without additional views that include characterizing the caudal vena cava and hepatic veins (volume status), measuring the urinary bladder (volume estimation and urine output), screening for free air (pneumoperitoneum, pneumoretroperitoneum), and assessing gastrointestinal motility.

Focused Ultrasound Examination of Canine and Feline Emergency Urinary Tract Disorders

1233

Laura Cole, Karen Humm, and Helen Dirrig

 Video content accompanies this article at <http://www.vetsmall.theclinics.com>.

This article discusses the usefulness of ultrasound examinations in the management of the patient with an emergency urinary tract disorder. It discusses the use of previously described point-of-care ultrasound protocols such as the abdominal focused assessment with sonography for trauma, triage, and tracking protocol in the unstable azotemic patient. Point-of-care ultrasound examination can help direct investigations and expedite the diagnosis of specific causes of azotemia. The limitations of point-of-care ultrasound assessment of the kidneys, ureter, bladder, and urethra are also addressed, emphasizing that point-of-care ultrasound examination should complement and not replace a complete urinary tract ultrasound examination.

Focused Ultrasound of the Fetus, Female and Male Reproductive Tracts, Pregnancy, and Dystocia in Dogs and Cats

1249

Robert M. Fulton

Add “in dogs and cats”? This article covers image acquisition of the fetus and the reproductive organs of the female (cervix, gravid and nongravid uterus, and ovaries) and male (testicles and prostate) reproductive tracts. This article is a brief overview of normal sonographic anatomy and important clinical conditions for each sex using point-of-care ultrasound as a screening test. In addition to normal sonographic appearance and common conditions of the scrotum and testes, prostate, uterus, and ovaries, this article discusses the use of ultrasound for diagnosis of and evaluating pregnancy, fetal maturation, and fetal stress during dystocia.

Section IV: Focused Ultrasound of Vascular Disease**Focused Ultrasound of Vascular System in Dogs and Cats—Thromboembolic Disease 1267**

Erin Mays and Kathryn Phillips

In small animals, point-of-care ultrasound can be used by nonradiologist sonographers to identify thrombosis at several anatomic sites. Dogs and cats are well-suited for vascular interrogation using ultrasound because of their small body size. Ultrasound can be used to investigate targeted vessels based on clinical signs. The safety and tolerability of the examination makes this a useful modality to evaluate critical patients for evidence thromboembolic disease. Once vascular imaging techniques are learned they can be easily coupled with other point-of-care examinations such as focused cardiac ultrasound, Vet Blue, AFAST, and TFAST.

Focused Ultrasound of Superficial–Soft Tissue Swellings, Masses, and Fluid Collections in Dogs and Cats 1283

Susanne Stieger-Vanegas

Soft tissue swellings, masses, and fluid collections commonly occur in small animal patients and can be the main reason for the clinical examination of the patient or an incidental finding. Several of these masses are likely benign or nonneoplastic, and ultrasound can help further evaluate these lesions to guide treatment planning. Careful attention to optimizing the ultrasound technique and Doppler settings is necessary to ensure that the vascularization of a mass is assessed correctly.

Section V: Focused Ultrasound of the Eye**Ocular Ultrasound Abnormalities and Optic Nerve Sheath Diameter in Dogs and Cats 1295**

Jane Cho

Indications for, technique, and findings for normal and abnormal ocular ultrasound are discussed, with specific sonographic findings, images, differential diagnoses, and other considerations. Because the eye is a fluid-filled structure, ultrasound can be used as a screening test when pathology prevents direct examination. Structural abnormalities, such as lens luxation, retinal detachments, and intraocular and orbital masses, also may be defined better using point-of-care ultrasound. Details on additional ophthalmic diagnostics, treatment, and prognosis are not covered.

Section VI: Integrating POCUS Information**Global FAST for Patient Monitoring and Staging in Dogs and Cats 1315**

Gregory R. Lisciandro and Stephanie C. Lisciandro

Please verify if FAST should be expanded at first use – “focused assessment with sonography for trauma”?: Global FAST consists of abdominal FAST, thoracic FAST, and Vet BLUE combined as a single point-of-care ultrasound examination used as an extension of the physical examination. By applying its unbiased set of 15 data imaging points, information is

gained while avoiding image interpretation errors, such as satisfaction of search error and confirmation bias error, through selective POCUS imaging. Moreover, Global FAST is used for integrating information from both cavities, rapidly screening for the Hs and Ts of cardiopulmonary resuscitation, and staging localized versus disseminated disease, helpful diagnostically and prognostically for patient work-up. By seeing a problem list, patient care is improved.