

Lecture Title: Point of Care Ultrasound (POCUS) of the Thorax
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Summary:

The purpose of this presentation is to illustrate common indications for emergency thoracic ultrasound (tFAST) in the setting of acute dyspnea/tachypnea in dogs and cats. Point of Care Ultrasound (POCUS) is a more appropriate term. Ultrasound movie clips will be compared to baseline thoracic radiographs made at presentation to our Emergency Service. Movie clips of pneumothorax, pleural effusion, and lung consolidation will be compared to normal ultrasound examinations. Changes in the appearance of pathology over time will illustrate how tFAST can help monitor progression or resolution of abnormalities over time.

The practice of emergency ultrasound is based on two paradigms: immediate results and focused examinations. The benefit of emergency ultrasound to patient care is realized when a specific clinical question is raised in the history/physical examination or when specialty services are delayed. A focused examination does not replace a comprehensive echocardiogram or abdominal ultrasound examination. Instead, the emergency ultrasound provides timely diagnostic information and guidance for high-risk procedures.

Emergency thoracic ultrasound is commonly termed tFAST, **thoracic Focused Assessment using Sonography for Trauma, Triage, or Trending**. tFAST can be performed in real time at the patient's cage-side. Its availability, relatively low cost, and lack of ionizing radiation gives it some advantages to thoracic radiography or computed tomography. However, it has some major limitations and will never replace thoracic radiography in the diagnosis of thoracic diseases.

tFAST assesses two major areas of the thorax: (1) the lung/pleura and (2) the heart. This presentation will focus more on non-cardiac etiologies, but both will be discussed since they are closely related in most clinical situations.

Ultrasound artifacts occur at the interface of soft tissue and gas or bone. Simply stated, ultrasound succeeds in traveling through soft tissues to provide various anatomic images relative to depth; but fails at traveling through gas and bone. Reverberation artifacts ("dirty shadows") are repeating white lines that form when ultrasound waves contact gas. Stronger acoustic shadows ("clean shadows") give a complete absence of any signal (black spaces) when ultrasound contacts bone. Acoustic mismatching between aerated lung, pleura, chest wall and pathologic conditions produce artifacts that are useful in diagnosing pleural effusion, pericardial effusion, pneumothorax, rib fractures, and lung consolidation (pneumonia, contusion, edema, or neoplasia). Consolidated lung (pulmonary parenchyma with soft tissue rather than gas) is often referred to as "hepatized", meaning that the lung develops the ultrasound appearance of normal liver. This appearance is ubiquitous for blood, pus, water, and at times, even neoplastic tissue in the lungs. A common pitfall of ultrasound interpretation is the assumption that all hepatized lung is pathologic; if the lung is small and hepatized it is likely just atelectatic. Lung atelectasis is common, particularly in the dependent lung and lung surrounded by pleural fluid.

Key Learning Objectives:

- *Recognize Abnormal Fluid Accumulations as low signal (black regions) and monitor these accumulations by imaging the same region over time.*
- *Recognize Normal Aerated Lung as repeating linear echoes (reverberations) traveling along (or gliding across) ribs as the patient is breathing.*

- *Recognize and Respect the Limitations of a Sonographically Consolidated Lung*

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