KEY LEARNING OBJECTIVES

- Computed tomography (CT) is the gold standard for thoracic imaging
- Atelectasis should be minimized to avoid artefacts on images
- Contrast is not indicated when assessing lung

MULTIPLE CHOICE QUESTIONS

1. What size of metastatic nodules may be detected on radiography?

(A) 2 mm (C) 4 mm
(B) 3 mm (D) 5 mm

2. What size of metastatic nodules may be detected on CT?

(A) 2 mm
(B) 3 mm
(C) 4 mm
(D) 5 mm

3. What is the 'classic' appearance of *Angiostrongylus* on CT?

(A) Generalized interstitial pattern
(B) Generalized alveolar pattern
(C) Peripheral alveolar pattern
(D) Bronchial thickening

Around the abdomen: indications for abdominal CT

Matthew Winter

INTRODUCTION

Radiography and ultrasonography have been the routine screening tests of choice for decades in veterinary medicine, and in many practices constitute a portion of the minimum database for more complex work-ups. However, computed tomography (CT) is being used more frequently for the evaluation of veterinary patients with abdominal disease. Applications range from characterization of masses and staging neoplastic disease to evaluation of patients that present with acute abdominal signs.

STAGING DISEASE

As discussed in a prior session, CT has been used with increasing frequency to assess patients for neoplastic metastases including the detection of nodules, osseous lesions, generalized organomegaly, and lymphadenopathy. The characterization of masses through evaluation of size and distribution, as well as attenuation and enhancement characteristics, provides critical information regarding prognosis and response to therapy.

Characterization of masses is also useful for surgical planning, and for identifying involvement of nearby structures and/or vascular invasion. CT assessment of splenic masses has been reported with some features aiding in distinguishing between benign and malignant splenic masses. In the case of adrenal masses, specific imaging features have been described that allow for accurate characterization of masses as benign or malignant, and may potentially allow for the distinction between pheochromocytoma and adenocarcinoma.

ACUTE ABDOMEN

More recently, the utility of CT for the evaluation of patients with suspected intestinal obstruction has been

described. Specifically, the accuracy of CT was compared to that of radiography and ultrasonography. The accuracy of CT was found to be slightly better than that of ultrasonography, especially when the operator dependence of ultrasonography is factored in. In addition, CT is rapid, and can typically be performed with sedation. For the evaluation of gastrointestinal obstruction, contrast was not necessary, but will likely provide additional information depending on the ultimate diagnosis (i.e. luminal foreign body vs. intestinal mass/neoplasia).

Pancreatitis cases can also be imaged via CT. Complete sonographic evaluation of the pancreas is often not possible due to the presence of gas in intestinal segments or hyperattenuating fat. CT is not limited by these factors, and can often provide a complete assessment of the pancreatic parenchyma and regional lymph nodes. CT has also proven valuable in the identification of pancreatic neoplasms, including insulinomas.

GENITOURINARY TRACT

CT, as well as other techniques of more direct visualization, has supplanted the excretory urogram for evaluation of the urinary tract. CT excretory urography can be critical to evaluating renal function, ureteral patency, ureteral course and the trigone in cases of urinary incontinence, stranguria or dysuria. While these studies can be technically demanding, they can reveal much about abnormalities in urinary tract anatomy and pathophysiology.

VASCULAR LESIONS

Perhaps one of the most common applications of CT in the abdomen is for the evaluation and characterization of portosystemic vascular anomalies using CT angiography. Since the early 2000s there have been many researchers that have described the CT imaging features of portosystemic shunts, arteriovenous fistulas and other vascular malformations. Properly acquired studies obtained during the different phases of enhancement (arterial, portal and venous) can yield images with detailed vascular anatomy. This information is often used for surgical planning or for planning other interventional procedures.

CONCLUSION

While there are many uses for CT in the abdomen, the studies listed above and extrapolations thereof constitute the majority of our abdominal CT caseload. These are key questions that can be answered with a properly planned and executed CT examination.

KEY LEARNING OBJECTIVES

- Computed tomography (CT) is excellent for the evaluation of the acute abdomen
- Portosystemic shunts can be accurately detected and characterized using CT angiography
- CT is critical for characterization of masses, surgical planning and staging neoplastic disease

MULTIPLE CHOICE QUESTIONS

1. What can CT be used to distinguish accurately?

(A) Adrenal adenomas from adrenal adenocarcinomas

(B) Pancreatic adenocarcinoma from pancreatitis

(C) Hepatocellular carcinoma from hepatoma

(D) Intestinal adenocarcinoma from lymphoma

2. Which of the following is true as it pertains to the accuracy of CT in the diagnosis of gastrointestinal obstruction?

(A) CT is not as good as ultrasonography

(B) CT is not as good as radiography

(C) CT is better than ultrasonography

(D) CT is operator dependent

3. Accurate characterization of portosystemic vascular anomalies requires assessment of how many vascular phases? Which are they?

(A) 3: arterial, capillary, venous

(B) 2: arterial and venous

(C) 1: venous

(D) 3: arterial, portal, venous

A headache or a pain in the neck? Head and neck CT

Chris Warren-Smith

Computed tomography (CT) eliminates superimposition and within the head this allows far superior evaluation of the nasal chambers, frontal sinuses and the soft tissues of the head compared to conventional radiography. CT may also be used to evaluate the cranial vault although it is worth noting that magnetic resonance imaging (MRI) remains superior to CT for evaluating the brain. CT can be considered for assessment of nasal disease for differentiating neoplasia from infectious and inflammatory disease, diseases of the larynx, salivary glands and lymph nodes and for assessment of dental changes.

For scanning the head, a bone and soft tissue reconstruction should be performed with slice thickness of 2 mm for soft tissue and a thickness of 1.5 mm or less for the bone reconstruction (Figure 1). Generally, pre- and post-contrast images are advised, with only soft tissue

reconstructions required post contrast. When scanning the brain, noise should be minimized by using thicker reconstructions, typically 3 mm (small dogs and cats) to 5 mm in larger patients. Sequential rather than helical scanning may also result in better images for the brain, although helical scanning is preferred for all other structures.

CT of the spine is particularly useful in patients with trauma, where the speed of CT and the bone detail is ideal for fracture detection while being able to keep the patient immobilized. This is particularly true for the neck. Other conditions where CT can be useful include atlanto-axial subluxation, discospondylitis and some mineralized discs. CT is also useful for assessment of the thyroid glands, lymph nodes and muscles of the neck and also for stick injuries and tracking foreign bodies.

KEY LEARNING OBJECTIVES

- Computed tomography (CT) is superior to radiography due to the lack of superimposition, thus improving sensitivity and specificity for lesions particularly in the nasal cavity
- Magnetic resonance imaging (MRI) remains superior to CT for assessing the brain
- Contrast administration must be performed for any soft tissue disease assessment in the head and neck

Area	kV	mAs	Rotation time	Pitch	Detector size	Reconstruction
Head (general)	130	220	1.5 s	0.8	0.6 mm	1.5 mm bone, 2 mm soft tissue
Brain sequence	130	270	1.5 s	7.2 mm	0.6 mm	3 mm
Neck (soft tissue)	130	130	1.0 s	0.8	1.2 mm	2–3 mm

Figure 1: Protocol suggestions for the head and neck