Objectives of the Presentation:

In this lecture, I will present clinical cases where radiographs provided a differential diagnosis to explain patient signs. I will then give supplemental modalities (mostly ultrasound) that helped to narrow the differential diagnosis list. Part of the lecture will review common pitfalls in normal radiographic anatomy that are occasionally misinterpreted as abnormal.

Review of the Modalities

Veterinary diagnostic imaging has grown tremendously in the past 10 years. Digital radiology and cross sectional imaging modalities like ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI) have profoundly improved our ability to diagnose many small animal diseases. Digital radiography improves image quality while at the same time making radiographs easy to make and share with others. Ultrasound units are becoming more common in small animal veterinary practice. Ultrasound exams come in many forms, from the focused emergency exam to comprehensive vascular imaging. CT and MRI are gaining ground, mostly in specialty practices.

Digital Radiography: Of all the imaging advances available to veterinarians, the transition from film-based radiography to digital has had the most impact. The benefits of digital radiography include: (1.) easier steps to making an acceptable image, (2.) improved image quality overall, (3.) the ability for images to viewed in multiple places at one time, (4.) less space for darkrooms, film storage, etc.

Some vendors will claim "one-technique-fits all" for their digital radiography units. This has somewhat done away with the art of making a great radiograph. The truth is that one technique will seldom make the perfect exposure, unless all of your patients are
one size (like in a cat-only hospital). A recent study evaluated the use of the magical technique of **100 kVp at 2.5 mAs** (Copple C, Roberstons I, et al, 2013). As expected, this single technique will overexpose (saturate) anatomy of small patients or air-filled organs (like the lungs) and underexpose thick, large and giant breed dog anatomy. The bottom line is that digital radiography is SO much easier than film-based radiography, but don’t get out of hand. Make a technique chart that includes a minimum of 4 settings.

**Ultrasound:** Ultrasound as an extension of the ER doctor’s physical exam is widely accepted in both human and veterinary emergency practice. Many private practices have trained in-house doctors for more comprehensive examinations. Alternatively, trained ultrasound doctors/technicians are hired by practices to provide additional diagnostic information for various abdominal and cardiac diseases. The operative word here is “trained”… the value of an ultrasound exam is 100% dependent on the skill of the operator. Relative to human medicine, the diagnostic demands of ultrasound is fairly greater. Questions regarding the extent of a liver or bladder mass, the sources of vomiting/diarrhea, and the presence of vascular anomalies are often evaluated with ultrasound before any other modality. The bottom line is to diagnose what you are capable of diagnosing… start with simple things (cysts, fluid pockets, etc.) and build from there. Examples of different ultrasound machines and their potential uses will be presented in lecture.

**Computed Tomography:** CT uses a beam of x-rays opposite a detector rotating around a patient. The result is a computer mapping of the different x-ray-attenuating characteristics of tissues. These x-ray attenuating characteristics are given a number (CT number or Hounsfield Unit) based calibration of pure water to zero. The final product is a matrix of pixels where each pixel has a number representing a volume of tissue density. The liver attenuates x-rays more than pure water, so the liver generally has a CT number between 40 and 50. Bone attenuates more than liver so CT numbers of bone are generally well over 300. The final image can also be manipulated (windowed) to accent a particular range of attenuations, like for bone or lung.
You may have heard the term CAT scan, which stands for Computed Axial Tomography. Nowadays, the scans can be reformatted from a transverse (or axial) plane into sagittal, dorsal, oblique, and 3-D orientations. This is why the “A” in CAT scan was dropped. We are not limited to the axial plane anymore. Three-dimensional and multiplanar reformatting help orient surgeons for surgical planning, including approach and regional vasculature.

The process of acquiring CT images usually requires general anesthesia, but multidetector (multi-slice) CT technology has increased acquisition speed to a point where immobilization devices alone may be used for some acquisitions. These faster CT units are expensive. Slower-speed scanners are economically priced.

*Magnetic Resonance (MR) Imaging:* MRI takes advantage of the resonance properties of protons within organs, allowing for subtle differentiation in the contrast of soft tissues. Assessment of the brain and spinal cord by MRI has revolutionized the practice of veterinary neurology. MRI also has the advantage of CT in reducing superimposition with thin scan slices.

Availability, cost, and long scan times are the major limiting factors to using MR in veterinary practice. MR capabilities depend on the strength of the magnet, measured in Tesla (T). Veterinary practices generally have 3.0T magnets or lower. Stronger magnets provide better detail in a shorter amount of time. When magnet strengths are equal, image quality tends to be proportional to scan time. Scanning protocols try to strike a balance between image quality and scan time.

**Comparing the Modalities**

Practical considerations like anesthetic requirements, cost, and availability are crucial to deciding which modality to choose when offering advanced diagnostics to the client. Other considerations that may not be readily obvious are the objective criteria used to assess image resolution (basically, image quality).

*Contrast Resolution.* Contrast resolution refers to the ability to distinguish between shades of gray in an image. For example, MRI, which has exquisite contrast resolution
for soft tissues, is the modality of choice for identifying subtle changes in gray and white matter of the brain.

Spatial Resolution. Spatial resolution refers the ability to distinguish two small, closely spaced objects as separate. Small animals can have small changes in anatomy when they are diseased. If the modality can resolve only 5 mm of tissue, lesions smaller than 5 mm will be averaged as part of the surrounding tissues and appear indistinct or invisible.

Temporal Resolution. An imaging modality’s ability to record anatomy in real time is termed temporal resolution. This is best depicted with ultrasound—for example, in assessing cardiac contraction.

**Comparison of the imaging modalities available to small animal practitioners.**

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>Availability</th>
<th>Anesthesia/Sedation</th>
<th>Radiation Producing</th>
<th>Spatial Resolution</th>
<th>Contrast Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiography</td>
<td>+</td>
<td>+++</td>
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<td>++</td>
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<tr>
<td>Ultrasound</td>
<td>(++)</td>
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<td>Seldom</td>
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<tr>
<td>CT</td>
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<td>Usually</td>
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<td>MRI</td>
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<td>+</td>
<td>Always</td>
<td>-</td>
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**Comparisons to Radiography**

What benefits do advanced modalities like CT and MR have over the greater availability and cheaper cost of good old-fashioned radiographs?

Improved overall image quality and clearer representation of patient anatomy are obvious answers. A radiograph is simply a shadow of the three dimensions of a patient’s anatomy summed onto a two dimensional screen or film. CT and MR produce thin slices of patient anatomy. That third dimension is thin, reducing superimposition of unwanted patient anatomy around an area of interest. Additionally, CT and MR provide
greater shades of gray (improved contrast resolution) relative to the 5 shades of gray on a radiograph (gas, fat, soft tissue, bone, metal).

*Common Indications (First two in bold are the MOST COMMON at AMC):*

- **Nasal discharge, epistaxis, or facial/head deformity.** --- CT
- **Acute or chronic paresis, neurologic deficit, or spinal pain.** --- MR
- Tympanic bulla evaluation (inner, middle, or external ear disease distinction).
  --- CT or MR
- Identifying pulmonary metatastasis (better than radiography). --- CT
- Evaluating a source of pleural or peritoneal effusion. --- CT
- Prior to any thoracotomy for lung or mediastinal disease. --- CT
- Seizures or any behavior change. --- MR
- Congenital and acquired vascular anomalies including portosystemic shunts and arteriovenous malformations. --- CT
- Evaluating vascular environment and tissue of origin (lymph node, thyroid, salivary gland, other) of neck masses. --- CT
- Root signature sign or any chronic lameness. --- MR
- Detailed evaluation of shoulder/rotator cuff disease. --- MR
- Caval invasion with adrenal tumors. --- CT
- Thrombus formation (aortic, venous, tumor thrombus, any hypercoagulable state). --- CT
- Pericardial effusion evaluation, to differentiate neoplasia from idiopathic etiologies. Also to determine heart tumor resectability. --- MR
- Pre-surgical evaluation for any soft tissue tumor. --- CT or MR
- Complex pelvic fractures (any polytrauma) --- CT
- Intra-pelvic masses. --- CT or MR
CASE PRESENTATIONS:

CASE 1: Pre-dental radiographs, 8 yo FS DSH II/VI heart murmur

**Radiographic Findings:** Soft tissue mass surrounded by fat, cranial to the cardiac silhouette, with focal widening of the mediastinum.

**DDX:** Neoplasia (lymphoma, thymoma, thyroid carcinoma ectopia/metastasis, other), lymphadenopathy/granuloma, or benign mediastinal cyst (Zekas,LI, Adams WM. Cranial mediastinal cysts in 9 cats. Vet Radiol Ultrasound, 2002).

  - Majority of cranial mediastinal masses in cats at AMC (14/18) are cysts. No particular radiographic or clinical sign differentiates benign cyst from other.
  - The difference between a benign cyst and the other possible differentials is HUGE; so it’s important to differentiate; Ultrasound is a fast and easy way to do this. Cysts need not be aspirated as they often fill back up.

CASE 2: Anorexic, azotemic 12 yo DSH with a palpable abdominal mass

**Radiographic Findings:** Right-sided kidney enlargement; normal left kidney. Multifocal mineral opacities are in both kidneys. The urinary bladder is normal.

**DDX:** Neoplasia (lymphoma, carcinoma), obstructive hydronephrosis, pyelonephritis, subcapsular pseudocysts, FIP, and compensation.

  - Normal kidney length in cats on a VD view is approximately 2.0-2.6 X L2.
  - Compensation is less likely if the other kidney is normal in size.
  - FIP tends to cause bilateral renal enlargement but some reports indicate unilateral enlargement (Lewis K, O'brient et al, 2010, JSAP).
  - Lymphoma and carcinoma can be diagnosed with ultrasound; most notably, the subcapsular hypoechoic rim can indicate neoplastic infiltration (Valdés-Martínez A, Cianciolo R., Vet Radiol Ultrasound, 2010).
  - When organs or masses are HUGE (like in this case), never forget to add CYST to your DDX… (Beck JA, Bellanger M, et al. Austr Vet J, 2000).
CASE 3 and more…

The purpose of one of the case presentations is to illustrate the variable, subtle and not-so-subtle, radiographic and ultrasound manifestations of gastrointestinal mechanical obstructions in dogs and cats.

KEY POINTS:

- In DOGS, consider an obstruction when the maximum small intestinal serosa-to-serosa diameter exceeds 1.5-2.0 times the height of a lumbar vertebral body.
- In CATS, consider an obstruction when the maximum small intestinal serosa-to-serosa diameter exceeds 2.0-2.5 times the height of a lumbar vertebral body.
- If one population of small intestine is greater in diameter than other populations, this should raise concern for obstruction, regardless of the actual ratio to a vertebra.
- Shape of the small intestinal serosa-to-serosa margin is more important than diameter for linear foreign bodies in dogs and cats.
- The stomach is an important predictor of intestinal obstruction, even if the obstruction is not in the stomach.

Radiography vs Ultrasound:

Several peer-reviewed articles have recently compared radiography and ultrasound in the diagnosis of a mechanical obstruction. It is generally accepted that when the two technologies are used together, there is a greater confidence in the decision for surgery. While this may be true, availability and sonographer experience will limit the usefulness of ultrasound in an emergency situation. Radiography and physical exam findings remain the primary deciding factors in diagnosing a mechanical obstruction at the Animal Medical Center.

REFERENCES WITH ABSTRACT:

KIDNEYS:

The purpose of this study was to investigate the association between renal hypoechoic subcapsular thickening observed ultrasonographically and the presence of renal lymphosarcoma in cats. The ultrasonography database was retrospectively searched for cats that underwent ultrasonic examination and ultrasound guided needle renal aspirate, renal biopsy, or necropsy. One radiologist unaware of the final diagnosis evaluated the images for the presence of hypoechoic subcapsular thickening and other abnormal findings. Fifty-four cats met the inclusion criteria. Hypoechoic subcapsular thickening was found in 21 cats of which 17 had lymphosarcoma; the remaining four cats had a different diagnosis. Eleven out of 33 cats without hypoechoic subcapsular thickening were positive for lymphosarcoma, and the rest had a different diagnosis. There was a significant association between hypoechoic subcapsular thickening and renal lymphosarcoma (P = 0.001). The positive predictive value of hypoechoic subcapsular thickening for lymphosarcoma was 80.9% and the negative predictive value was 66.7%. The sensitivity and specificity of hypoechoic subcapsular thickening for the diagnosis of renal lymphosarcoma were 60.7% and 84.6%, respectively. The results of this study indicate that the presence of hypoechoic subcapsular thickening in feline kidneys is associated with renal lymphosarcoma.

PMID: 17691636  [PubMed - indexed for MEDLINE]

Department of Veterinary Clinical Sciences, University of Sydney, New South Wales.

OBJECTIVE: To evaluate clinical features, anatomical location, nature of pseudocyst fluid, results of surgical treatment and links with underlying renal disease in cats with perirenal pseudocysts. DESIGN: A retrospective study of 26 affected cats, including 8 treated surgically. RESULTS: Nineteen (73%) affected cats were male. The median age was 11 years. Most presented for abdominal enlargement and had varying degrees of renal dysfunction on presentation. Thirteen cats (50%) had bilateral pseudocysts. The pseudocyst fluid was a transudate or modified transudate in all cases. All surgically treated cats had subcapsular perirenal pseudocysts. Associated renal lesions were identified in all cats that had renal biopsies or detailed ultrasonographic examinations. Surgery relieved clinical signs but did not stop progression of renal disease. Cats survived a median of 9 months after surgery and survival was correlated statistically to degree of azotaemia at presentation. Percutaneous drainage of pseudocysts was ineffective in controlling long-term fluid accumulation.

CONCLUSIONS: Subcapsular perirenal pseudocysts are formed in cats by accumulation of transudate between the capsule and parenchyma of the kidney as a result of underlying parenchymal disease. Pseudocyst formation can occur at variable stages of renal dysfunction. Resection of the pseudocyst wall is usually effective in eliminating signs but does not stop progression of renal disease. The prognosis for cats with pseudocyst formation is related to the degree of renal dysfunction at time of diagnosis. PMID: 10860154  [PubMed - indexed for MEDLINE]


A 12-year-old, 6 kg, castrated male Siamese-cross cat was referred for investigation of an abdominal mass. The cat was found to have a left perinephric pseudocyst (PNP), accompanied by azotemia, with a small right kidney detected on ultrasound. Glomerular filtration rate (GFR) was determined by renal scintigraphy and was found to be low, with the left kidney contributing 64% of the total GFR. Percutaneous ultrasound-guided drainage of the PNP did not improve the GFR, and fluid reaccumulated within a short period of time. Laparoscopic fenestration of
Abdominal ultrasonographic findings associated with feline infectious peritonitis: a retrospective review of 16 cases. Lewis KM, O'Brien RT. J Am Anim Hosp Assoc. 2010 May-Jun;46(3):152-60. Department of Clinical Sciences, College of Veterinary Medicine, Kansas State University, Manhattan, Kansas 66506, USA.

The feline infectious peritonitis virus (FIPV) is a mutated form of the feline enteric coronavirus (FeCV) that can present with a variety of clinical signs. The purpose of this retrospective study was to analyze abdominal ultrasonographic findings associated with cats with confirmed FIPV infection. Sixteen cases were included in the study from a review of medical records at two academic institutions; inclusion was based either on necropsy lesions (n=13) or a combination of histopathological, cytological, and clinicopathological findings highly suggestive of FIPV infection (n=3). The liver was judged to be normal in echogenicity in 11 (69%) cats, diffusely hypoechoic in three cats, focally hyperechoic in one cat, and focally hypoechoic in one cat. Five cats had a hypoechoic subcapsular rim in one (n=3) or both (n=2) kidneys. Free fluid was present in the peritoneal cavity in seven cats and in the retroperitoneal space in one cat. Abdominal lymphadenopathy was noted in nine cats. The spleen was normal in echogenicity in 14 cats and was hypoechoic in two. One cat had bilateral orchitis with loss of normal testicular architecture. Although none of these ultrasonographic findings are specific for FIPV infection, a combination of these findings should increase the index of suspicion for FIPV infection when considered along with appropriate clinical signs PMID: 20439937 [PubMed - indexed for MEDLINE]


Renal pelvic dilatation is often recognized sonographically in dogs and cats, but ranges of measurements expected with different urologic conditions remain unknown. Ultrasound images of 81 dogs and 66 cats with renal pelvic dilatation were reviewed, and six groups were formed based on medical records: (I) clinically normal renal function, and (II) clinically normal renal function with diuresis; (III) pyelonephritis; (IV) noninfectious renal insufficiency; (V) outflow obstruction; (VI) miscellaneous nonobstructive anomalies. Medians for maximal pelvic width (range) for group I was 2.0 mm (1.0-3.8) in 11 dogs, and 1.6 mm (0.8-3.2) in 10 cats; for group II, 2.5 mm (1.3-3.6) in 15 dogs, and 2.3mm (1.1-3.4) in 16 cats; for group III, 3.6 mm (1.9-12.0) in nine dogs, and 4.0 mm (1.7-12.4) in seven cats; for group IV, 3.1 mm (0.5-10.8) in 33 dogs, and 2.8 mm (1.2-7.3) in 13 cats; for group V, 15.1mm (5.1-76.2) in six dogs, and 6.8mm (1.2-39.1) in 17 cats; and for group VI, 3.8mm (1.2-7.6) in seven dogs, and 3.0 mm (1.3-7.5) in three cats. Pelvic width in group I was lower than in groups III-V (P = 0.0001), but did not significantly differ from group II. Pelvic width > or =13 mm always indicated obstruction. While the proportion of bilateral pelvic dilatation was not different among groups, the difference in pelvic width (maximal-minimal) was greater in group V vs. groups I, II, and IV (P = 0.0009). These results confirm that renal pelvic dilatation can be detected sonographically in dogs and cats with clinically normal renal function, and that it increases with renal insufficiency, pyelonephritis, or outflow obstruction. Nevertheless, renal pelvic width varies substantially within groups and should be interpreted with caution PMID: 21322393 [PubMed - indexed for MEDLINE]
**GI OBSTRUCTIONS:**

**Association of intestinal disorders in cats with findings of abdominal radiography.** Adams WM, Sisterman LA, Klauer JM, Kirby BM, Lin TL. J Am Vet Med Assoc. 2010 Apr 15;236(8):880-6. doi: 10.2460/javma.236.8.880. Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin, Madison, WI 53706, USA.

**OBJECTIVE:** To compare the radiographic appearance of small and large intestines of cats with various medical conditions and create a quantitative index for interpretation of intestinal diameters on radiographic views of the abdomen.

**DESIGN:** Retrospective cohort study.

**ANIMALS:** 74 cats that underwent abdominal radiography.

**PROCEDURES:** Cats were assigned to 1 of 4 diagnosis categories: no gastrointestinal tract disease (n = 20), nonobstructive gastrointestinal tract disease (32), linear foreign body (LFB; 11), and small intestinal mechanical obstruction not caused by an LFB (11). Abdominal radiographs were evaluated without knowledge of history or diagnosis. Maximum and minimum external small intestine diameter (SID) and colon diameter (CD) were compared; dorsoventral and mediolateral measurements of the cranial end plate of L2 (VEL2) and L5 vertebrae were compared. Dorsoventral height of VEL2 from lateral radiographic views was used to determine maximum-SID:VEL2 and maximum-CD:VEL2 ratios. Gas patterns were evaluated.

**RESULTS:** Nonobstructive gastrointestinal tract disease was more likely than obstruction until a maximum-SID:VEL2 ratio > 2.0. At a maximum-SID:VEL2 ratio of 2.5, probability of a disease not related to the intestinal tract was < 4%. At a maximum-SID:VEL2 ratio of 3.0, probability of a mechanical intestinal obstruction was > 70%. When the maximum-CD:VEL2 ratio was 2.0, probability of LFB was 50%; as the maximum-CD:VEL2 ratio increased beyond 2.0, likelihood of LFB decreased. Both gas pattern and CD correlated with diagnosis category.

**CONCLUSIONS AND CLINICAL RELEVANCE:** Normalizing ratios of maximum-SID:VEL2 and maximum-CD:VEL2 obtained from measurements on lateral radiographic views of the abdomen in cats were related to diagnosis category PMID: 20392185 [PubMed - indexed for MEDLINE]


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A cross-sectional study was performed on acutely vomiting dogs to compare the accuracy of radiography and ultrasonography for the diagnosis of small-intestinal mechanical obstruction and to describe several radiographic and ultrasonographic signs to identify their contribution to the final diagnosis. The sample population consisted of 82 adult dogs and small-intestinal obstruction by foreign body was confirmed in 27/82 (33%) dogs by surgery or necropsy.

Radiography produced a definitive result (obstructed or not obstructed) in 58/82 (70%) of dogs; ultrasonography produced a definitive result in 80/82 (97%) of dogs. On radiographs, a diagnosis of obstruction was based on detection of segmental small-intestinal dilatation, plication, or detection of a foreign body. Approximately 30% (8/27) of obstructed dogs did not have radiographic signs of segmental small-intestinal dilatation, of which 50% (4/8) were due to linear foreign bodies. The ultrasonographic diagnosis of small-intestinal obstruction was based on detection of an obstructive lesion, sonographic signs of plication or segmental, small-intestinal dilatation. The ultrasonographic presence or absence of moderate-to-severe intestinal diameter enlargement (due to lumen dilatation) of the jejunum (>1.5 cm) was a useful discriminatory finding and, when present, should prompt a thorough search for a cause of small-intestinal obstruction. In conclusion, both abdominal radiography and abdominal
ultrasonography are accurate for diagnosing small-intestinal obstruction in vomiting dogs and either may be used depending on availability and examiner choice. Abdominal ultrasonography had greater accuracy, fewer equivocal results and provided greater diagnostic confidence compared with radiography. 


**BACKGROUND:** An ultrasonographic pattern of thickened muscularis propria in the small intestine and lymphadenopathy have been associated with gastrointestinal lymphoma and inflammatory bowel disease (IBD) in cats. **OBJECTIVES:** To investigate the association of these imaging biomarkers with IBD and lymphoma in cats. **ANIMALS:** One hundred and forty-two cats with a histologic diagnosis of normal small intestine (SI) (n = 56), lymphoma (n = 62), or IBD (n = 24). **METHODS:** Retrospective case review. Pathology records from 1998-2006 were searched for cats with a diagnosis of normal, IBD, or lymphoma, an ultrasonographic examination < 28 days before surgery, and without ultrasonographic evidence of a mass. Multinomial regression analysis was used to determine the association of imaging biomarkers with disease status. **RESULTS:** Cats with thickening of the muscularis propria detected by ultrasonographic examination were more likely to have lymphoma compared with normal SI cats (odds ratio [OR] = 4.0, 95% confidence interval [95% CI] 1.2-13.1, P = .021) and those with IBD (OR = 18.8, 95% CI 2.2-162.7, P = .008). Histologic samples of cats with muscularis propria thickening were more likely to have disease infiltrates in both the mucosal and submucosal layers (OR = 8.1, 95% CI 1.7-38.4, P = .008) than cats with normal SI. Cats with ultrasonographic evidence of lymphadenopathy were more likely to have a diagnosis of lymphoma (OR = 44.9, 95% CI 5.1-393.0, P = .001) or IBD (OR = 10.8, 95% CI 1.1-106.3, P = .041) than normal SI. Cats with lymphadenopathy were more likely to have a diagnosis of lymphoma or IBD PMID: 20102493 [PubMed - indexed for MEDLINE]

**THE MEDIASTINUM**

**Cranial mediastinal cysts in nine cats.** Zekas LJ, Adams WM. 6. Vet Radiol Ultrasound. 2002 Sep-Oct;43(5):413-8. Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin-Madison, 53706, USA.

Nine cats, from 11 to 17 years of age (mean 13.6 years of age), were diagnosed with a cranial mediastinal cyst. Thoracic radiographs in all cats were characterized by an increased soft tissue opacity in the cranial mediastinum confirmed to be a cyst by ultrasonography or necropsy. Ultrasonographically cysts appeared as an anechoic mass. A low-cellularity clear fluid was obtained on aspiration. The majority of the cats (n = 8) presented for unrelated conditions with no signs of respiratory distress. No treatment for the cyst was pursued except for drainage during ultrasonographic-guided aspiration in several cats. On follow-up of eight cats, none were symptomatic for the cyst from 3-45 months after diagnosis. Mediastinal cyst should be considered when a cranial mediastinal mass is evident radiographically in an older cat. The majority of feline cranial mediastinal cysts are benign with no need for treatment PMID: 12375774 [PubMed - indexed for MEDLINE]
Non-cardiac thoracic ultrasound in 75 feline and canine patients. Vet Radiol Ultrasound. 2000 Mar-Apr;41(2):154-62. Reichle JK, Wisner ER. Department of Veterinary Clinical Sciences, The Ohio State University, Columbus 43210-1089, USA.

The purpose of this study was to describe the ultrasonographic appearance of non-cardiac diseases of the small animal thorax. Ultrasound images from a total of 75 animals (26 cats and 49 dogs) were compared to cytologic, histopathologic, and necropsy findings. Clinical diagnoses included neoplasia of the mediastinum, pleura, or lungs (43); idiopathic mediastinal cyst (3); diaphragmatic or peritoneopericardial hernia (4); lung lobe torsion (1); pulmonary eosinophilic infiltrates (1); and idiopathic, chylous, congestive heart failure, or lymphangiectasia associated pleural effusion (14). In the remaining 9 patients, a definitive diagnosis was not obtained. Ultrasound-guided fine needle aspirate was performed in 56 patients; 1 of these also had an ultrasound-guided tissue core biopsy. Of the fine needle aspirates, 51 (91%) were diagnostic. Ultrasound examination, particularly when accompanied by guided tissue sampling, can be a valuable tool in the diagnosis of non-cardiac intrathoracic lesions. PMID: 10779076 [PubMed-indexed for MEDLINE]

Syncope associated with swallowing in two British Bulldogs with unilateral carotid body tumours. Phan A, Yates G, Nimmo J, Holloway S. 11. Aust Vet J. 2013 Jan;91(1-2):47-51. doi: 10.1111/avj.12016. Advanced Vetcare, 6 Robertson Street, Kensington, Victoria, 3031, Carotid body tumours were diagnosed in two British Bulldogs that each had a history of syncopal episodes induced by eating, drinking or pulling on the leash. In both dogs, a cervical mass was identified using computed tomography (CT) or magnetic resonance imaging, with carotid body tumour (CBT) being the histopathological diagnosis. A heart base mass was also identified in one dog by both CT and echocardiography. Swallowing syncope has been reported in the human literature in association with cervical mass lesions, but this is the first report in dogs. The present cases emphasise the value of advanced imaging of the head and neck in dogs presenting with clinical signs of syncope associated with swallowing and the importance of careful manipulation of the neck in patients with CBTs. PMID: 23356372 [PubMed-in process]

Thymoma removal in a cat with acquired myasthenia gravis: a case report and literature review. Shilo Y, Pypendop BH, Barter LS, Epstein SE. Vet Anaesth Analg. 2011 Nov;38(6):603-13. doi: 10.1111/j.1467-2995.2011.00648.x. Veterinary Medical Teaching Hospital, School of Veterinary Medicine, University of California-Davis, One Shields Avenue, Davis, CA 95616, USA. HISTORY AND PRESENTATION: A 12 year old, 4.2 kg, domestic long hair, castrated male cat was presented with regurgitation, inability to retract the claws, general weakness, cervical ventroflexion and weight loss. A thymic mass was evident on radiographs. Acetylcholine receptor antibody titer was positive for acquired myasthenia gravis (MG). Thymectomy via midline sternotomy was scheduled. indexed for MEDLINE]


The purpose of this study was to assess the effects of systemic hypertension (SHT) on echocardiographic and radiographic cardiovascular variables in affected cats compared with healthy geriatric cats. Secondary objectives were to determine whether there were any relationships between these findings and age or systolic blood pressure (SBP). Fifteen healthy cats (>8 years of age with normal SBP) and 15 hypertensive cats (SBP > 180 mm Hg) were studied. Each cat was evaluated for standard echocardiographic parameters and 4 different aortic root dimensions. Seventeen variables were measured from right lateral and dorsoventral
radiographic views. Left ventricle wall thickness was greater in the SHT group (5.1 +/- 0.9 mm) than in the healthy cats (4.2 +/- 0.5 mm). Left ventricular hypertrophy in the SHT cats often was not severe, and mean measures were considered normal. Some cats had asymmetrical septal hypertrophy (ASH) in the basilar portion of the septum as determined from the 2-dimensional view of the left ventricular outflow tract. ASH was greater in cats with SHT. Comparisons of the proximal ascending aorta indicated the presence of dilatation in the SHT cats, and comparison of the ascending aorta to the aortic annulus was helpful in differentiating between the 2 groups. The distal aortic root measurements and ratios evaluated by echocardiography were significantly different between the 2 groups of cats (P = .0001) and were significantly correlated with SBP (P = .0001) but not age (P > .3). PMID: 12141303 [PubMed - indexed for MEDLINE]

RADIOGRAPHIC TECHNIQUE

It is important to optimize digital radiographic technique settings for small animal imaging in order to maximize image quality while minimizing radiation exposure to personnel. The purpose of this study was to evaluate two objective methods for determining optimal kVp values for an indirect flat panel digital detector. One method considered both image quality and personnel exposure as endpoints and one considered only image quality. Phantoms simulated veterinary patients of varying thicknesses with lesions of varying sizes. Phantoms were exposed to a range of kVp values (60, 81, 100, and 121), using different mAs settings for each phantom. Additionally, all phantoms were exposed to a standard test exposure of 100 kVp/2.5 mAs. Scattered radiation was recorded and used as a measure of personnel exposure. When personnel exposure was considered, a figure of merit was calculated as an endpoint of optimization. The optimal kVp value for each phantom was determined based on the highest signal difference-to-noise ratio with or without inclusion of the figure of merit. When personnel exposure was not considered, increasing kVp resulted in higher signal difference-to-noise ratios and personnel exposure increased when both patient thickness and kVp increased. Findings indicated that a single standard technique of 100 kVp/2.5 mAs was only optimal for most medium-sized patients. Images of thinner patients should be made with a lower kVp. Very large patients require a higher kVp than 100 regardless of the optimization method used. Personnel exposure from optimized techniques was low and not expected to exceed annual occupational dose limits. PMID: 23293957 [PubMed - in process]