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Veterinary Referral News from Angell Animal Medical Center

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Current Techniques in Laparoscopic Surgery

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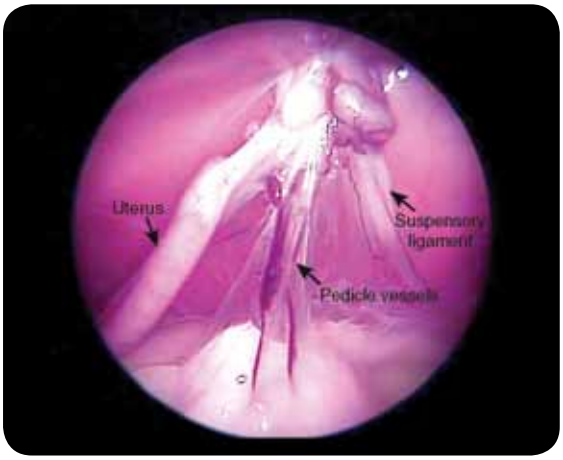
"With the introduction of a new, single laparoscope-instrument cannula, this procedure can now be performed through a single portal."

Laparoscopic surgery in veterinary medicine is gaining popularity and, as our experience with the technique grows, so does the complexity of the procedures we can offer. Like any new technique, extensive training and experience are required, but once the relevant skills have been mastered there are many surgical procedures that can be performed quickly, easily, and with minimal morbidity.

Ovariohysterectomy is one of the most common surgical procedures performed in the United States. Research has shown that laparoscopic ovariectomy (OVE)/ovariohysterectomy (OVH) enables us to perform the same procedure while reducing the amount of post-operative pain experienced. These patients have also been shown to experience a faster return to normal activity than those animals undergoing sterilization via celiotomy.



↗ Figure 1: Laparoscopic ovariectomy

Although OVH has long been considered the "gold standard" for elective female sterilization, studies have demonstrated no difference in the incidence of intraoperative complications and long-term urogenital problems such as endometritis, pyometra, and urinary incontinence for OVH versus OVE. While uterine neoplasia is still possible following OVE, the reported risk of uterine tumor development is only 0.03%, with 85–90% of those tumors being benign leiyomyomas.

↗ Figure 2: Dr. Grange performing a laparoscopic ovariectomy

Given the lack of evidence supporting removal of the uterus, development and improvement of laparoscopic sterilization techniques have concentrated on LapOVE rather than LapOVH. In the hands of an experienced laparoscopic surgeon the procedure can be performed as quickly and efficiently as the open technique. Usually animals are operated on in dorsal recumbency and the procedure requires two ventral midline incisions. One incision is just caudal to the umbilicus, allowing insertion of the laparoscope (5mm). The second incision is on ventral midline (5–10mm), between the umbilicus and pubis, allowing insertion of laparoscopic instruments.

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Inside

Courtesy Consultations

Angell specialists are available for consultation Monday–Friday 9:00 a.m.–5:00 p.m.

Additionally, Angell emergency doctors are available for consultation on weekends and after hours (7:00 a.m.–11:00 p.m.).

Referral Contact Information

Please see Page 7 and the back cover of this newsletter for full contact information.

Online Referral Forms

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Intravenous Pamidronate Administration for Palliative Treatment of Bone Tumors

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Angell's Oncology Service offers intravenous pamidronate treatment as part of palliative care for dogs with bone tumors. Pamidronate is a bisphosphonate, in the same family as ibandronate (Boniva®) and alendronate (Fosamax®), which are oral drugs used to treat osteoporosis in human medicine.

Osteosarcoma cells produce an extracellular matrix of osteoid, and can also activate osteoclasts to cause bone destruction. Therefore, osteosarcoma is associated with both production of new bone and osteolysis, commonly seen in radiographic images of these lesions. Excessive osteolysis can lead to severe pain, the most common clinical sign associated with osteosarcoma.

Osteoclasts secrete hydrogen ions and proteolytic enzymes, causing degradation of the bone matrix and release of calcium and phosphorus. Bisphosphonates are endocytosed by osteoclasts and cause disruption of intracellular metabolism and cell signaling, leading to apoptosis. In addition, in vitro studies have shown that bisphosphonates can reduce tumor cell invasiveness, adhesion, and migration, as well as decrease concentrations of circulating VEGF (vascular endothelial growth factor), which is involved in angiogenesis.

Pamidronate is given once monthly as an intravenous infusion. Studies have demonstrated clinical improvement in alleviation of pain, as well as decreases in urine N-telopeptide (NTx) excretion (a sensitive and specific marker of bone resorption), and increased relative primary tumor bone mineral density. In one study, 28% of dogs experienced improved clinical signs for greater than four months, with a median duration of pain alleviation of 231 days.

While another study failed to demonstrate improvement in duration of pain alleviation by the addition of pamidronate to palliative radiation therapy, findings suggested that adding pamidronate to a palliative protocol alleviates pain to a greater degree. The group treated with pamidronate demonstrated decreased urine NTx excretion and increased tumor-relative bone mineral density compared to the placebo group. In humans, findings have been similar, but pamidronate use is still advocated to decrease the risk of pathologic fracture.

Pamidronate is a relatively safe drug but can be associated with several adverse effects. The most significant is the risk of renal failure, and to minimize this risk, the drug is administered as a two-hour infusion with saline diuresis. Renal values and a CBC are also checked prior to each administration. In humans, an acute, systemic inflammatory reaction has been reported and may be related to ocular complications such as conjunctivitis and uveitis. Osteonecrosis of the maxilla and mandible has also been reported in humans.

"In addition, *in vitro* studies have shown that bisphosphonates can reduce tumor cell invasiveness, adhesion, and migration, as well as decrease concentrations of circulating VEGF (vascular endothelial growth factor), which is involved in angiogenesis."

In addition to their use for alleviating pain in dogs with osteosarcoma, bisphosphonates have been demonstrated to reduce pain in cats with oral squamous cell carcinoma, and are used to treat paraneoplastic hypercalcemia. Hypercalcemia of malignancy is associated with multiple neoplastic diseases including lymphoma, multiple myeloma, and anal sac apocrine gland adenocarcinoma. In lymphoma and anal sac apocrine gland adenocarcinoma, hypercalcemia is usually caused by tumor-associated production of parathyroid hormone-related protein (PTH-rp), which promotes osteoclastic bone resorption and renal tubular calcium reabsorption. Bisphosphonates can induce apoptosis of osteoclasts, leading to decreased bone resorption and subsequent reduction in serum calcium levels. We reserve the use of bisphosphonates for severe cases of paraneoplastic hypercalcemia that are refractory to other treatments (saline diuresis, corticosteroids, and treatment of the primary tumor).

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Feline Tooth Resorptions

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↗ FORL gingival hyperplasia

Feline tooth resorptions are a progressively destructive disease of cat teeth. They have been previously known as resorptive lesions, FORL (feline odontoclastic resorptive lesions), neck lesions, and cervical line lesions, and are sometimes inappropriately called "feline cavities." They are very common (research studies estimate that as many as 65% of domestic cats are affected). I generally expect that every cat will be affected, until I can prove otherwise with dental radiographs. There is no known etiology. These lesions can affect any teeth.

The lesions of the premolars and molars usually begin along or just below the gingiva and may first be noticed as gingival hyperplasia grows into the defect in the tooth. Any tooth or gingival damage at the normal gingival margin predisposes that tooth to plaque and calculus buildup; teeth affected by these lesions often have more periodontal disease. These diseased teeth are eventually lost, sometimes leaving behind infected roots. The canine teeth are more commonly affected along the root, below the gingival margin. When these teeth are affected, the bone around the root becomes inflamed. This can often be seen as a supra-gingival swelling. Sometimes these teeth seem to "grow" or become longer, sometimes referred to as super-eruption (I prefer the term "extrusion"). This happens because the bone surrounding the tooth root weakens as it becomes inflamed. The bony separation is usually noticeable on dental radiographs. Eventually the tooth is completely loosened and falls out, leaving an open, infected, inflamed socket. Other times, the root is resorbed enough that the top, or crown, of the tooth falls off, appearing to have broken off. When this type of lesion occurs, the tooth root will appear striated or wispy and less radio-opaque. Quite often, when the incisors are affected, the canines are affected as well, and vice versa.

↗ FORL resorptive lesions

These lesions can be very painful (cats have more nerve endings in their teeth than humans), and the secondary periodontal disease may cause more pain and potentially affect other areas of the body. Signs that may be seen with these lesions are decreased dry food chewing, vomiting (especially of undigested food), chewing more on one side of the mouth, halitosis, and decreased grooming. Acute, painful malocclusions can occur when teeth weakened by tooth resorptions are luxated and occlude abnormally with the opposing teeth. "Chattering" (movement of the lower jaw, or other local twitching) can often be elicited by palpation of the affected teeth. Attempts to repair or treat these lesions have been generally unsuccessful. The current recommended treatment is extraction of the affected teeth or any problematic root remnants.

"They are very common (research studies estimate that as many as 65% of domestic cats are affected)."

Pet owners often ask how their cats will chew with fewer teeth. The answer is "better!" after the painful, diseased teeth are removed. The gingival tissue can be quite tough after it heals, and most cats resume eating dry food after these affected teeth are extracted.

angell.org/dentistry

For more information about Angell's dentistry service, please visit **angell.org/dentistry.** Dr. Rosenblad is available for consultations or referrals at **617 524-5643,** or e-mail **dentistry@angell.org.** ■

Focused Assessment with Sonography for Trauma (FAST)

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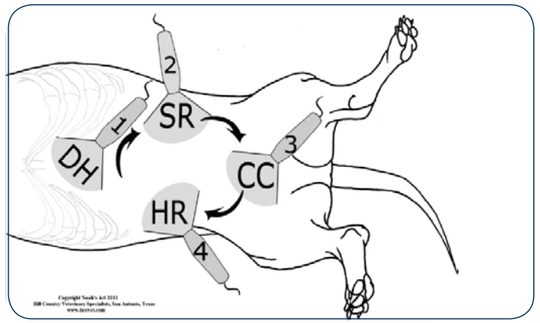

Figure 3: Used with permission by Gregory R. Lisciandro, DVM, Dipl. ABVP, DACVECC

Figure 1: A large volume of neoplastic effusion in a cat, likely due to a pancreatic mass. Liver lobes are visible.

Figure 2: Small volume of a cellular effusion (ingesta) next to the small intestine in a dog. The dog had been bitten by another dog, rupturing the bowel.

Ultrasound has become an imaging modality that is commonly used in many general practices, specialty hospitals, and emergency rooms. Although considerable training and practice are needed to perform a thorough abdominal ultrasound with accuracy, many emergency rooms are using ultrasound as part of the initial physical examination, as a quick method to evaluate a patient's abdomen or chest for the presence of free fluid. Little training is required to become quite proficient at this simple evaluation, which can take less than five minutes and can save lives. This article discusses abdominal focused assessment with sonography for trauma (AFAST) and thoracic focused assessment with sonography for trauma (TFAST).

AFAST was first described in veterinary medicine by Boysen, et al. in 2004.[1] It is a technique that we apply to almost every trauma patient in our emergency room, but it also finds use for patients with bleeding abdominal masses, acute abdomen, fluid accumulations from heart failure, and as a daily post-surgical screen in the recovery period following abdominal surgery. In traumatic cases, the AFAST is often repeated after fluid resuscitation to look for free fluid accumulation, and to see if the urinary bladder is filling with urine. Animals having an anaphylactic reaction can show gall bladder wall thickening, with striations that can be detected on an AFAST exam.[2]

To perform the AFAST exam, the patient is positioned in either right or left lateral recumbency and then four specific sites are scanned in a fanned fashion with the probe (Figure 3). The first site is the diaphragmatico-hepatic location (1), which evaluates the area of the liver, stomach, and diaphragm; second is the spleno-renal location (2), which evaluates the spleen and the right kidney; third is cysto-colic region (3), which evaluates the area of the urinary bladder; and lastly is the hepato-renal location (4), which focuses on the right kidney and the right side of the liver.[1,3] The patient's positioning, the four specific locations of evaluation, and the order they are evaluated are described differently by different

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> Focused Assessment with Sonography for Trauma (FAST) (Continued from previous page)

sources. Using the same procedure with each patient is helpful in order to compare patient to patient, and to become familiar with the location and structures within the abdomen. When bleeding is severe, the most dependent location is often where free abdominal fluid is located and can then be sampled via abdominocentesis. When bleeding is milder the hemorrhage is found near the location of the damaged organ.[3]

The abdominal fluid score (AFS) is used to rate the severity of blood/fluid accumulation using the AFAST technique and it follows a simple four-point scale. If fluid is present at one of the four sites, a point is given. An AFS of 0 means there is no abdominal fluid, whereas an AFS of 4 means there is fluid present in all four sites using the AFAST technique.[3] Dr. Gregory R. Lisciandro determined that patients with an AFS of 1–2 rarely become anemic, whereas patients who have an AFS of 3–4 often become anemic and about 25% of them require blood transfusions.[4]

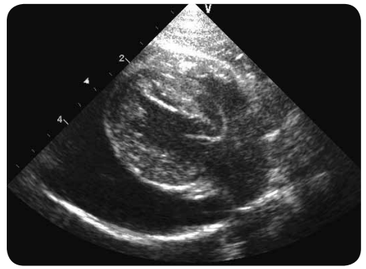

Figure 4: Pericardial effusion in a cat. The nearly anechoic effusion is visible between the pericardium (visible as a white arcing line at the bottom of the view) and the bright epicardium that is seen on the surface of the myocardium.

The FAST technique can also be applied to the thorax. TFAST permits evaluation for pneumothorax, "wet" or "dry" lungs, or more simply for pleural or pericardial fluid.[5] Patients can either be in lateral or sternal recumbency, but both sides of the thorax should be evaluated. Pleural fluid often accumulates just caudal to the heart (and rostral to the diaphragm). This is also a convenient place to perform thoracocentesis because the *depth* of the fluid is often greatest at this location, making damage to the lung, heart, or other intrathoracic structures during thoracocentesis unlikely. When pericardial fluid is present, the heart/pericardium is usually very easy to image because it is larger and often comes closer to the chest wall, making interference from the air-filled lung less likely.

While the physical exam is still where the most important information is gleaned about a patient, the FAST techniques can be used in many situations to give additional information and further clarify the clinical picture of a traumatized or critically ill patient.

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For more information about Angell Animal Medical Center's Emergency/Critical Care service, Angell's E/CC doctors, or referring a patient to the Angell E/CC service, please call **617 522-5011** or e-mail **emergency@angell.org**. You can also reach Dr. Bracker at **kbracker@angell.org** and Dr. Whelan at **mwhelan@angell.org**. ■

1. Boysen SR, Rozanski EA, Tidwell AS, et al. Evaluation of a focused assessment with sonography for trauma protocol to detect free abdominal fluid in dogs involved in motor vehicle accidents. *J Am Vet Med Assoc* 2004; 225(8):1198–1204.

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angell.org/oncology

Please contact the Angell Oncology service at **617 541-5136** or **oncology@angell.org** if you have any questions about the use of pamidronate, or if you have a patient who you feel may benefit from this treatment. Dr. Mahoney can also be reached at **jmahoney@angell.org**. ■

References:

Fan TM, Charney SC, de Lorimier LP et al. Double-blind placebo-controlled trial of adjuvant pamidronate with palliative radiotherapy and intravenous doxorubicin for canine appendicular osteosarcoma bone pain. *J Vet Intern Med* 2009; 23(1):152–160.

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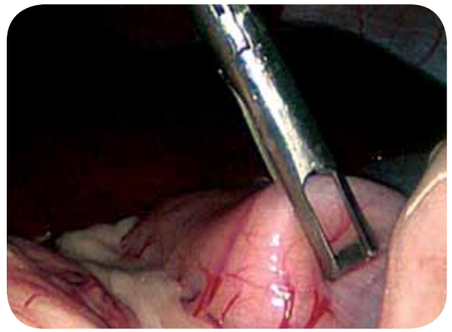

Figure 3: Laparoscopic view of Babcock forceps grasping stomach 5–6cm orad to the pylorus

Figure 4: Stomach being exteriorized for suturing of gastropexy site from outside abdomen

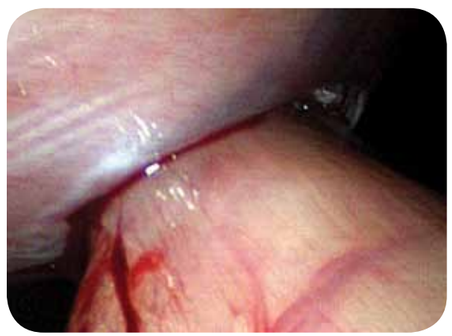

Figure 5: Laparoscopic image of completed gastropexy

With the introduction of a new, single laparoscope-instrument cannula, this procedure can now be performed through a single portal. Because of the need to manipulate and triangulate instruments within the insufflated abdominal cavity, the technical difficulty of the procedure is dependent on the size of the patient. Smaller patients make the procedure more technically demanding, but with the appropriate equipment and experience this technique can be applied even to small dogs and cats.

The benefits of laparoscopy apply to any procedure that would normally be performed via celiotomy. Commonly performed laparoscopic techniques include abdominal cryptorchiectomy, cystotomy, or prophylactic gastropexy. Prophylactic gastropexy is another technique growing in popularity as the awareness of the risk factors and consequences of gastric dilatation and volvulus (GDV) increases among owners. Although multiple techniques for laparoscopic gastropexy have been described, these often involve intracorporeal knot-tying, making the procedure technically difficult and significantly lengthening surgical times. The most common method of gastropexy is a laparoscopic-assisted technique involving laparoscopic visualization and grasping of the stomach just orad to the pyloric antrum. The anticipated gastropexy location is then exteriorized via enlargement of the right paracostal portal to a 4cm incision, and the gastropexy is completed from outside the abdomen. This technique is termed "laparoscopic-assisted," and many procedures can be adapted from a regular "open approach" to this technique, reducing morbidity. Laparoscopic-assisted gastropexy can be performed minimally invasively either alone, or in combination with laparoscopic OVE or neutering.

With careful patient selection, other more complex procedures such as adrenalectomy, cholecystectomy, cisterna chyli ablation for patients with idiopathic chylothorax (in combination with thoracoscopic thoracic duct ligation/sub-total pericardectomy), and abdominal exploration for organ biopsy can be performed.

For more information about Angell's Surgery service, please visit **angell.org/surgery.** To contact Angell's surgeons by phone or to refer a patient to the Angell Surgery service, please call **617 541-5048** or e-mail **surgery@angell.org.** You can also reach Dr. Grange at **agrange@angell.org**. ■

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Figure 1 from Kim et al.: Feasibility of single-portal access laparoscopic ovariectomy in 17 cats. *Veterinary Record* 2011; 169:179.

Figures 3, 4, and 5 from Freeman LJ: Gastrointestinal laparoscopy in small animals. *Vet Clin North Am Small Anim Pract.* 2009 Sep; 39(5):903–24.

CE SEMINAR

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Upcoming Angell CE Seminar: Dermatology

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Sunday, April 1, 2012
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Dr. Klaus Loft
Dermatology service, Angell Animal Medical Center

Dr. Candace Souza
Pfizer Senior Veterinary Specialist

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