Current Techniques in Laparoscopic Surgery

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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 ovarioectomy (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.

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 leiomyomas.

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.

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

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Intravenous Pamidronate Administration for Palliative Treatment of Bone Tumors

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In the past, the treatment of osteosarcoma patients was limited to chemotherapy. The most common clinical sign associated with osteosarcoma is pain, which is related to bone destruction. 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 multiple myeloma, and anal sac apocrine gland adenocarcinoma. 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).

Pamidronate is given once monthly as an intravenous infusion. Oral drugs used to treat osteoporosis in human medicine. Bisphosphonates are endocytosed by osteoclasts causing degradation of the bone matrix and release of calcium and phosphorus. Bisphosphonates can induce apoptosis of osteoclasts, 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.

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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 the roots are often left behind after the removal 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.

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Focused Assessment with Sonography for Trauma (FAST)

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 and 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 Boyes, et al. in 2004. 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 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.

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. 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.

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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 paracolic 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 pericardiectomy), and abdominal exploration for organ biopsy can be performed.

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