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Veterinarians interested in adding minimally invasive surgery (MIS) to their surgical repertoire need a distinct set of skills. These MIS skills do not transfer from open surgery; they require specific training. Training based solely on practice in live patients becomes limited and inconsistent. In addition, ethical and financial issues arise when advanced procedures are practiced in live patients. This article discusses the Veterinary Applied Laparoscopic Training program, which provides simulation-based training for MIS.

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The practice of veterinary laparoscopic surgery has grown in the past decade. Surgical devices routinely used in human laparoscopy have become available to the veterinary surgeon, at a cost the veterinary market can bear. This includes electrosurgical generators, access ports, stapling devices, tissue dissectors, and a wide array of laparoscopic handpieces. With the development of the laparoscopic clip applier in the 1990s, laparoscopic cholecystectomy came to be commonly performed in people. During this time, numerous training programs were developed to rapidly bring human surgeons up to speed.

**Anesthesia for Endoscopy**  
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Anesthesia for endoscopic surgery can be challenging depending on surgical manipulations and patient comorbidity. Anesthetists must understand the possible systemic changes and complications that are associated with endoscopic surgery. Pneumoperitoneum induces vasoconstriction, reduces cardiac output, and decreases functional residual capacity in the cardiopulmonary system. Both hypoventilation caused by the thoracoscopic procedure and CO₂ insufflation increase PaCO₂. To prevent the problems associated with high PaCO₂, monitoring of end-tidal CO₂ (ETCO₂) and capability of positive pressure ventilation are crucial. Sudden changes of ETCO₂ should be monitored closely. Endoscopic surgery should be a less invasive procedure; however, appropriate analgesia remains necessary.
Laparoscopic-Assisted Surgical Procedures

Michele A. Steffey

Laparoscopic-assisted procedures allow a balance between the improved patient recoveries often associated with smaller incisions and the need for appropriate visualization of visceral organs and identification of lesions. The organ systems of small animal veterinary patients that are highly amenable to laparoscopic-assisted procedures include the urinary bladder, the gastrointestinal tract, and the reproductive tracts. Laparoscopic-assisted procedures are especially beneficial in the approach to luminal organs, allowing the organ incision to be exteriorized through the body wall, protecting the peritoneal cavity from contamination from luminal contents. Procedure-specific morbidities and patient selection should be considered when choosing between assisted laparoscopic and open approaches.

Advances in Laparoscopic Surgery

Chloe Wormser and Jeffrey J. Runge

Recently, a new platform of abdominal access, called single-port surgery, has emerged in human and veterinary laparoscopy. The single-port platform enables all laparoscopic instruments, including the telescope, to pass individually through the same abdominal incision. Recently, there have been several published reports documenting the efficacy and safety of single-port procedures in veterinary patients. This article discusses the common single-port devices and instrumentation, as well as procedures now routinely offered in veterinary minimally invasive surgery.

Advances in Flexible Endoscopy

Anant Radhakrishnan

Flexible endoscopy, a minimally invasive diagnostic and potentially therapeutic tool, has become more available over the past decades. A fiberscope is used to visualize the lumen of the area of interest and collect tissue or fluid samples for evaluation. Samples can be submitted for histopathology, cytologic analysis, and bacterial culture. Flexible endoscopy is being investigated. This article provides a brief review of equipment and basic flexible endoscopy followed by an overview of advanced flexible endoscopic procedures that focuses on the gastrointestinal tract. The procedures included here may become more readily available and improve diagnosis and treatment.

Advances in Urinary Tract Endoscopy

Allyson C. Berent

The use of endoscopy in veterinary medicine has become the mainstay of diagnosis and treatment in the subspecialty of small animal urology over the past decade. This subspecialty is termed endourology. With the common incidence of urinary tract obstructions, stones disease, renal disease, and urothelial malignancies, combined with the recognized invasiveness and morbidity associated with traditional surgical techniques, the use of endoscopic-assisted alternatives using interventional endoscopic techniques has become appealing to both owners and clinicians. This article
provides a brief overview of some of the most common urologic procedures being performed in veterinary medicine.

Complications and Conversion from Endoscopic to Open Surgery 137
MaryAnn G. Radlinsky

Endoscopic surgery is a rapidly expanding modality of diagnosis and treatment of small animal patients. The development of skills, equipment, and minimally invasive means of correcting complications may be of great importance in decreasing the incidence of conversion from endoscopic to open surgery; however, conversion to an open approach should never be seen as a failure. Conversion should be considered at any time it is of the greatest benefit for the patient. This concept is important enough to warrant discussion with the owner before surgery and acceptance of the need to convert without further consultation during the procedure.

Advances in Video-Assisted Thoracic Surgery, Thoracoscopy 147
Joseph Brad Case

Video-assisted thoracic surgery (VATS) is an evolving modality in the treatment and management of a variety of pathologies affecting dogs and cats. Representative disease processes include pericardial effusion, pericardial neoplasia, cranial mediastinal neoplasia, vascular ring anomaly, pulmonary neoplasia, pulmonary blebs and bullae, spontaneous pneumothorax, and chylothorax. Several descriptive and small case reports have been published on the use of VATS in veterinary medicine. More recently, larger case series and experimental studies have revealed potential benefits and limitations not documented previously. Significant technological advances over the past 5 years have made possible a host of new applications in VATS. This article focuses on updates and cutting-edge applications in VATS.

Advances in Otoscopy 171
MaryAnn G. Radlinsky

Ear disease is a common condition in dogs and cats, and otoscopy should be performed on every case. Video-otoscopy is an incredible tool for the diagnosis, treatment, and management of ear disease. It may serve as a form of positive reinforcement because the client can readily see progress made with treatment. This article focuses on the proper use of video-otoscopy for the diagnosis, treatment, and management of ear diseases in dogs and cats. Proper anatomy, equipment, and diagnostic understanding are required to minimize the risk of recurrent or chronic otitis, which is a source of discomfort for the patient and frustration for the owner and the clinician.

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