Proceedings, 10th Annual Meeting

May2-4, 2013
Hilton Key Largo

Key Largo, FL, USA



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Meeting schedule
10th Annual Meeting, May 2-4, 2013
Hilton Key Largo, Key Largo, Florida, USA

- Wednesday May 1st

7-9 pm: Welcome reception. Appetizers and a cash bar are available.

- Scientific Sessions, Thursday May 2nd through Saturday May 4rd

See speaker schedule below

- Business sessions Thursday May 2nd and Friday May 3rd

Thursday May 2nd	Business sessions	On the agenda
To follow scientific session	Executive business meeting for current and past officers of the VES and sponsors.	Future meeting structure and locations. More Europe? VES Economy update Liaisons Open forum

Friday May 3rd		On the agenda
To follow scientific session	VES Business meeting for all members	Future meetings locations. VES Economy update Feed-back on this meeting and the web site. Liaisons and sponsors Open forum

Thursday May 2nd	Speaker	Title
6:30-7:00 am	Breakfast served in meeting room-sponsored by Covidien and Karl Storz	
7:00-7:20	James G. Coisman, DVM SA Surgery Resident University of Florida, Gainesville, FL	Comparison of Surgical Variables in Cats Undergoing Single-Incision Laparoscopic Ovariectomy Using a LigaSure or Extracorporeal Suture Versus Open Ovariectomy
7:20-7:40	Mathieu Manassero Centre Hospitalier Vétérinaire d'Alfort, Ecole Nationale Vétérinaire d'Alfort, Maisons-Alfort, France	The SILS Port device for Laparoscopic Ovariectomy in Dogs with Standard Laparoscopic Instruments: tips and tricks
Short Comm 7:40-7: 52	James G. Coisman, DVM SA Surgery Resident University of Florida, Gainesville, FL	Efficacy of Decontamination and Sterilization of Single-Use Single Incision Laparoscopic Surgery Ports

Short Comm 7:52-8:04	Jeffrey J Runge DVM DACVS University of Pennsylvania, Philadelphia, PA	Single Port Laparoscopic Adrenalectomy in a Ferret Utilizing a Commercially Available Multitrocar Device
8:04-8:24	Poggiani, F. M, DVM, MsC, Veterinary Endoscopy Service, Brasília, Brazil	Correlation between Radiography and Bronchoscopy in a Pig Model.
8:24-8:44	Alex Gallagher, DVM, MS, DACVIM University of Florida, Gainesville, FL	Use of Argon Plasma Coagulation in Veterinary Medicine: Application in two cases.
8:44-9:04	Carlo Maria Mortellaro Università degli Studi di Milano, Milano, Italy	Nasopharyngeal lymphomas vs. lymphoplasmacitic nasopharyngitis in cats: the endoscopist-pathologist alliance to meet the challenge.
Coffee Break sponsored by Karl Storz and Covidien 9:04am-9:30am		
9:30-9:50	Brian Evans, DVM Coastal Animal Hospital, Encinitas, CA	The Economics and Feasibility of Incorporating Rigid Endoscopy in General Practice

Cont'd Thursday May 2nd 9:50-10:10	Andrea Pievaroli, DVM Roma, Italy	Two-portal laparoscopic ovariohysterectomy in dogs: Feasibility in normal and pathologic conditions
10:10-11:10	**Key Note Presentation:** **Todd R. Tams, DVM, DACVIM** **VCA Chief Medical Officer** **Los Angeles, CA**	**Economy of Endoscopy**
11:10-12:20	6 min Videopresentations: Session Chair: Boel Fransson John Huhn, DVM Covidien Warren Briggs, DVM Ocean County/Fisher/New Prospect Vet Hosp, NJ Clarence Rawlings, DVM, DACVS University of Georgia	**"Gizmos and Tricks"** News from Covidien Briggs' Magnalift Laparoscopic Assisted Cryptorchidectomy; A new trick and an unusual case.

	J Brad Case, DVM, MS, DACVS University of Florida Jeff Runge DVM, DACVS University of Pennsylvania Sonja Zabel, DVM, MS, DACVD University of Georgia	The EndoCone SILS-Tricks Usage of Video-Otoscopy in Complex Otitis Patient
12:20-1:20 pm	Executive Business Meeting	

Friday May 3nd	Speaker	Title
6:30-7:00 am	Breakfast served in meeting room-sponsored by Covidien and Karl Storz	
7:00-7:20	Stéphane Libermann, DVM Centre Hospitalier	Thoracoscopic vs classic trans-diaphragmatic pacemaker implantation : comparative study

	Vétérinaire des Cordeliers Meaux, France	in 4 cases
7:20-7:40	Kazushi Asano, DVM, PhD, DJCVS Department of Veterinary Medicine College of Bioresource Sciences, Nihon University	Clinical application of thoracoscopy for intracavity chemotherapy in 4 dogs with mesothelioma
7:40-8:00	Sabrina dos Santos Costa DVM, MsC, PhD Pioneer Union of Social Integration, Brasilia, Brazil	Thoracoscopy on diagnostic approach of an intrathoracic myxosarcoma in a young dog
8:00-8:20	Phil Mayhew, DVM, DACVS University of California-Davis	Effect of one-lung ventilation with or without low-pressure carbon dioxide insufflation on cardiorespiratory parameters in cats undergoing thoracoscopy
8:20-8:40	Phil Mayhew, DVM, DACVS University of California-Davis	Evaluation of short-term outcome after video-assisted thoracoscopic lung lobectomy for resection of primary lung tumors in medium to large breed dogs
Short Comm 8:40-8:52	Kristian Ash, DVM Surgical Intern Guardian Veterinary Centre Edmonton, Alberta, Canada	Thoracoscopic diagnosis and treatment for recurrent pneumothorax secondary to penetrating trauma.
Coffee Break sponsored by Karl Storz and Covidien 8:52am-9:10am		

9:10-9:30	Kristian Ash, DVM Surgical Intern Guardian Veterinary Centre Edmonton, Alberta, Canada	Arthroscopic diagnosis of extracapsular crimp migration to an intra-articular position
Cont'd Friday May 3nd 9:30-9:50	Kimberly A. Agnello, DVM, MS, DACVS University of Pennsylvania	Articular cartilage lesions of the patellofemoral joint in dogs with naturally occurring cranial cruciate ligament disease
9:50-10:50	**Key Note Presentation:** **Brian S. Beale, DVM, DACVS** **Gulf Coast Veterinary Surgery** **Houston, Texas**	**Arthroscopic Surgery in Dogs - Is it worth the trouble and expense?**
10:50-12:00	6 min Videopresentations Session Chair: Michele Steffey Phil Mayhew, DVM, DACVS University of California, Davis John Shaaf, DVM North Mecklenburg Animal	**"Cool Cases"** Concurrent right-sided adrenalectomy and ureteronephrectomy in a cat with hyperaldosteronism Endoscopic Diagnosis of Epiglottic Retroversion in a Golden Retriever

	Hospital, N Dave Saylor, VMD VCA VRA Gaitersburg, MD	Placement of a Nasopharyngeal Stent in a Dog with Nasal Adenocarcinoma.
	Michele Steffey, DVM, DACVS University of California, Davis	Thoracic duct identification utilizing intraoperative near infrared fluorescent imaging
	Eric Monnet, DVM, DACVS Colorado State University	Diaphragmatic hernia repair in a dog with laparoscopy and knotless suture
	MaryAnn Radlinsky, DVM, DACVS University of Georgia	Maybe I shoulda' kept at this one and gotten it all out with the scope
12:00-1:00 pm	VES Business Meeting	

Saturday May 4th	Speaker	Title
6:30-7:00 am	Breakfast served in meeting room-sponsored by Covidien	

	and Karl Storz	
7:00-7:20	Stephanie L. Shaver, DVM Surgery Resident University of California-Davis	Short-term outcome of laparoscopic splenectomy in eight dogs.
7:20-7:40	Darren Imhoff, DVM Surgery Resident Colorado State University	Biomechanical Analysis of Laparoscopic Incisional Gastropexy with Intracorporeal Suturing Using Knotless Polyglyconate
7:40-8:00	Jeffrey J Runge DVM DACVS University of Pennsylvania	Initial Experience Utilizing V-LocTM suture for Total Intracorporeally Sutured Laparoscopic Gastropexy in Dogs
8:00-8:20	Poggiani, F. M, DVM, MsC Veterinary Endoscopy Service, Brasília, Brazil	Thoracoscopic Lung Biopsy in Healthy and Chronic Respiratory Disease in Swine
8:20-8:40	Kumiko Ishigaki, DVM Department of Veterinary Medicine, College of Bioresource Sciences, Nihon University	Combination of interventional radiology and laparoscopy for treatment of an extrahepatic portosystemic shunt in 2 dogs
8:40-9:00	Sarah Marvel, DVM Surgery Resident Colorado State University	Use of a Vessel Sealant Device for Cystic Duct Ligation in the Dog
Short Comm 9:00-9:12	Boel Fransson, DVM, PhD, DACVS Washington State University	Laparoscopy-assisted Pyloric Botulinum Toxin Treatment for Delayed Gastric Emptying in a Dog

Coffee Break sponsored by Karl Storz and Covidien 9:12-9:30am		
9:30-9:50	Katie Kennedy, DVM Surgery Resident Washington State University	Comparison of abdominal pneumoperitoneum volumes in lift laparoscopy with variable lift locations and tensile force
Cont'd Saturday May 4th 9:50-10:10	Towle Millard HA, DVM, MS, DACVS Purdue University, West Lafayette, IN	Video-gaming Ability is Predictive of Laparoscopy Skills in Third Year Veterinary Students
10:10-11:10	**Key Note Presentation:** **Claude A. Ragle DVM, DACVS, DABVP** **Washington State University**	**Advances in Equine Laparoscopy**
11:10-12:20	6 min Videopresentations Session Chair: Leigh Glerum	**"Complications"**

	Boel A. Fransson Washington State University	Intercostal port bleed x 2
	Warren Briggs New Jersey	Ovarian Pedicle Hemorrhage
	MaryAnn Radlinsky University of Georgia	Liver Hemorrhage
	Stephane Liebermann Centre Hospitalier Vétérinaire des Cordeliers Meaux, France	Thoracoscopic pacemaker lead reimplantation
	John Shaaf North Mecklenburg Animal Hospital, NC	Gastroesophageal intussusception with bradycardia
	Phil Mayhew University of California Davies	A smorgasboard of thoracoscopic complications
	J Brad Case University of Florida	

		Selective one-lung intubation

Comparison of Surgical Variables in Cats Undergoing Single-Incision Laparoscopic Ovariectomy Using a LigaSure or Extracorporeal Suture Versus Open Ovariectomy

James G. Coisman, DVM, J. Brad Case, DVM, MS, DACVS, Andre Shih, DVM, DACVA, Kelly Harrison, DVM, MS, Natalie Isaza, DVM, Gary Ellison, DVM, MS, DACVS

Objective—To evaluate the feasibility and versatility of single-incision laparoscopic ovariectomy (SILOVE) in cats using a single-incision laparoscopic port (SILP); to compare surgical time, complications, and post-operative pain after SILOVE using a LigaSure (SILOVE-LS) or extracorporeal suture (SILOVE-ECS), and open ovariectomy (open-OVE).
Study Design— Randomized, blinded, prospective study.
Animals—Healthy female Cats (n=24).
Methods—Cats underwent physical examination, packed cell volume, total solids and blood urea nitrogen analysis. Cats were randomly assigned to one of three groups: SILOVE-LS (n=8), SILOVE-ECS (n=8) or open-OVE (n=8). Surgery time, complications, and postoperative-pain scores were recorded and compared between groups.
Results— Single-incision laparoscopic ovariectomy was successful in (n=8) SILOVE-LS cats and (n=5) SILOVE-ECS cats. Surgical time was 71 minutes (range, 50-128) for the SILOVE-ECS group, 25 minutes (range, 16-30) for the SILOVE-LS cats, and 18 minutes (range, 13-23) for the open-OVE cats. Complications were more frequent in the SILOVE-ECS group and removal of the SILP was required to complete the ovariectomy in (n=3) cats. Cumulative 4-hour pain scores were not different between groups.
Conclusion—Single-incision laparoscopic ovariectomy using a SILP is a feasible and versatile method for OVE in cats. Single-incision laparoscopic ovariectomy using an extracorporeal suture is more time consuming and associated with more complications than either the SILOVE-LS or open-OVE methods.
Clinical Relevance—Use of the SILP for ovariectomy in cats is safe and apparently causes no more post operative pain than an open ovariectomy. The SILP may be useful for advanced laparoscopic and laparoscopic-assisted procedures in small animals while minimizing tissue trauma compared to traditional celiotomy.

The SILS Port device for laparoscopic ovariectomy in dogs with standard laparoscopic intruments: tips and tricks

Mathieu Manassero, Adeline Decambron, Dimitri Leperlier, Rosario Vallefuoco, Véronique Viateau

Service de chirurgie, Centre Hospitalier Vétérinaire d'Alfort, Ecole Nationale Vétérinaire d'Alfort, 7 avenue du général de Gaulle 94700 Maisons-Alfort, France

The aim of this case series was to describe a novel technique of single-incision laparoscopic ovariectomy in dogs using the SILS Port (Covidien), a single-port multiple-access device, in 40 client-owned dogs. A single 3-cm incision was made caudal to the umbilicus and the SILS Port device was bluntly introduced. Three cannulae, two 5-mm and one 12-mm, were inserted in the SILS Port through the access channels. In half cases, a transabdominal suspension suture was used to transfix the ovaries. In all cases, ovariectomy was performed using a standard straight non-roticulated laparoscopic grasper and a vessel sealer/divider device. Mean duration of the ovarian resection was 25.1±6.1 minutes (range 16-39 minutes). In five dogs (with transabdominal suspension suture), minor bleeding in the mesovarium or in the spleen was observed.
Since the SILS Port allows simultaneous use of two instruments and a telescope through a single incision, the suspension suture is not mandatory. The lack of a transabdominal suspension suture increased collision between instruments and the telescope, but triangulation capabilities remained sufficient to achieve visualisation, sufficient manoeuvrability and safe hemostasis. Time to perform ovarian resection remained unaltered with or without suspension suture and regardless of the fat score of the ovarian ligament but complications were less frequent without a suspension suture. With the 3-cm long skin incision, the device could always be placed safely under visual control to avoid damaging abdominal organs; this incision could facilitate ovaries extraction.

Efficacy of Decontamination and Sterilization of Single-Use Single Incision Laparoscopic Surgery Ports

James G. Coisman, DVM; J. Brad Case, DVM, MS, DACVS; Nadia D. Clark, BS, MPH; James F.X. Wellehan, DVM, PhD, DACZM, DACVM; Gary W. Ellison, DVM, MS, DACVS

Objective: To determine if traditional decontamination and Ethylene Oxide (EtO) gas sterilization is effective in eliminating bacterial viability from SILS ports in vitro.
Study Design: Experimental, in vitro comparison utilizing SILS Ports (n=5)
Materials and Methods: Sterile 6 mm biopsy punches were used to sample the central concave region of each SILS port. Five test cycles were performed. Negative control - SILS port maintained in sterile wrap and resterilized in EtO immediately following sampling. Positive control - SILS port exposed to a standard bacterial soil of $10^{\wedge 5}$/mL (*Staphylococcus aureus*, *Escherichia coli*, and *Mycobacterium fortuitum*) for 30 minutes followed by aerobic culture. Treatment port - SILS port exposed to same bacterial soil for 30 minutes then cleaned/sterilized using EtO followed by aerobic culture.
Results: None of the treatment group ports tested positive for bacterial growth at any point in this study. Bacterial growth was present in all five positive control ports and in one negative control port (p=0.032). The negative control port was positive for a spore forming *Bacillus* species thought to be an environmental contaminant. This contaminant was not identified in either the positive control or treatment samples.
The degree of bacterial growth in the treatment group was significantly different than the positive control group (p=0.018), but not the negative control group (p=0.45).

Conclusions: Standard decontamination and sterilization of the Single Use Device SILS port was effective at eliminating bacterial viability in vitro and may represent an economic and safe method for reuse of this port in veterinary surgery.

Single Port Laparoscopic Adrenalectomy in a Ferret Utilizing a Commercially Available Multitrocar Device

Jeffrey J Runge DVM DACVS, Nicole Wyre DVM, DAVBP

Department of Clinical Studies, Section of Surgery and the Section of Exotics. Matthew J. Ryan Veterinary Hospital of the University of Pennsylvania, Philadelphia, PA

Case Description: A two year old, 700g female spayed ferret presented for a single port laparoscopic left adrenalectomy that was noted on previous abdominal ultrasound.

Clinical Findings: The left adrenal had a single solitary 4mm mass. All other abdominal organs were within normal limits.

Treatment and Outcome: Single port laparoscopic surgery is an evolving surgical access platform that utilizes a single portal of entry into the abdominal cavity to preform laparoscopic procedures. Single port surgery consolidates all of the instruments to enter through this same portal of entry cause the traditional concept of triangulation to be altered. The Triport (Olympus) single port device was utilized for abdominal access. A 5mm 30 degree telescope was used with a 3mm Kelly graspers, a 5mm clip applier and a 3mm arthroscopic monopolar cautery hand piece. A (rescue port) 3mm ridged trocar was inserted intra-operatively to safely complete a portion of the procedure. During dissection the capsule of the adrenal mass was not ruptured and the entire adrenal mass was removed within 95 minutes. No intra-operative or post-operative complications occurred.

Clinical Relevance: The ferret in this report had a successful single port laparoscopic adrenalectomy with no evidence of mass reoccurrence over a 10-month follow-up period. Although a 3mm rescue port was utilized in this procedure, conversion to open laparotomy was not necessary. Single port laparoscopic surgery with a commercially available multitrocar device can accommodate the body wall thickness and maintain adequate pneumoperotineum in the ferret.

Correlation between chest examination with radiography and bronchoscopy in pig models

POGGIANI, F. M.[1] ; SILVA, M. A. M.[2]; GERING, A. P.[3]; CANOLA, J. C.[4]
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Our goal was to correlate bronchoscopy and radiography features in healthy and ill pigs. Forty Landrace adult pigs were included. Right lateral thoracic and ventrodorsal radiographs were performed. A flexible optic fiber bronchoscopic of 4,9mm diameter was used for bronchoscopic evaluation, which was introduced through the endotracheal tube and direct into the lumen of the distal trachea. Before the carina and through the tracheal bronchus, inspection of the right cranial lung lobe was performed. After passing through the carina, inspection of the right lung followed by the intermediate lobe, accessory lobe and right caudal lobe was done. Inspection of the left lung through the cranial and caudal portions of the left cranial lobe was completed. Spearman's rank correlation coefficient was used to investigate relationship between variables. In control group 9 animals (90%) showed mixed (interstitial and bronchial) radiographic pattern and one animal did not showed alteration. In ill group, two different mixed radiographic patterns were observed: twenty six animals (86%) showed interstitial and bronchial; two animals (7%) showed bronchial and alveolar radiographic patterns. Interstitial lung pattern was observed in two animals (7%). Bronchoscopic findings in both groups included secretions, stenosis, polypoid masses, erythema and bronchial bifurcation thickness. There was positive correlation only between bronchial bifurcation thickness and bronchial and interstitial radiographic patterns. Therefore, both techniques are necessary for respiratory evaluation, since different findings were observed in each one.

USE OF ARGON PLASMA COAGULATION IN VETERINARY MEDICINE: APPLICATION IN TWO CASES

Alex Gallagher, DVM, MS, DACVIM, Dept. of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, Gainesville, FL

Argon plasma coagulation (APC) is a noncontact technique that uses argon gas to conduct electrical energy to a tissue surface resulting in coagulation. The argon gas is ionized to form argon plasma which follows the path of least resistance allowing treatment of tissue directly in front of as well as lateral to the APC probe. Endoscopic application of APC has been used to treat a number of conditions in human medicine involving the gastrointestinal and respiratory tracts including: Barret's esophagus, gastric ulceration, vascular malformations, tumor ablations, recanalization of stenoses, treatment of stent in-growth and over-growth, and stent shortening ("trimming"). The purpose of this case report is to describe the endoscopic application of APC in two veterinary cases. In the first case, APC was used to successfully treat colonic vascular ectasia in a transfusion dependant dog. Medical therapy previously reported to be successful for this condition had failed to resolve the GI bleeding. In the second case, APC was used to manage tissue in-growth through a covered stent placed two years prior to treat nasaopharyngeal stenosis in a dog.

Nasopharyngeal lymphomas vs. lymphoplasmacitic nasopharyngitis in cats: the endoscopist-pathologist alliance to meet the challenge.

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Nasal and nasopharyngeal lymphomas are the most common feline upper respiratory tract tumors. However, nasopharyngeal lymphoma has been seldom considered a separate clinico-pathological entity. Nasopharyngeal lymphoma mimics severe inflammation and thus poses a challenge in its diagnosis. A high index of clinical suspicion along with multiple deep adequately sized and appropriately processed biopsies submitted for histology and immunohistochemistry are usually needed to achieve the correct diagnosis. Attempts to sample the tumors using endoscopic instruments are often unsuccessful because of the limited working space that can lead to the collection of non-diagnostic biopsies. In fact, an adequate amount of non-traumatized tissue sample is required for a definitive diagnosis since the frequent coexistence of the neoplasia with necrosis and inflammation.
Commonly, nasopharyngeal lymphomas present as extensive multilobulated masses, that may, in severe cases, fill the caudal nasopharynx. In early cases, these lesions mimic clinically lymphofollicular inflammatory processes. Both lesions may be easily visualized by retrograde nasopharyngoscopy using flexible pediatric videobronchoscope. Combining retrograde nasopharyngoscopy with concurrent anterograde insertion of a large bioptic opposing-cups forceps trough the nares, allows to obtain larger and less damaged tissue samples for histopathology, under continuing endoscopic guidance.
Patients often initially misdiagnosed as affected by chronic inflammation on clinical grounds had their diagnosis revised after histopathological examination of multiple samples excised with this technique. Microscopical examination often revealed the concomitance of lymphoma with chronic lymphoplasmacytic inflammation. This "anterograde-retrograde" technique proved ideal to sample primary nasopharyngeal lesions to confirm the diagnosis of inflammation versus lymphoma.

* Division of Small Animal Surgery
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Title: **The Economics and Feasibility of Incorporating Rigid Endoscopy in General Practice**

Authors: Brian Evans, DVM; J. Brad Case, DVM, MS, DACVS
Affiliations: Coastal Animal Hospital (Evans), Encinitas, CA 92024.

Objectives: To describe the economic and clinical characteristics of implementing rigid endoscopy in a new, single doctor general veterinary practice.
Design: Descriptive study
Animals included: Dogs and cats examined and treated at Coastal Animal Hospital in Encinitas, CA.
Methods: Invoices and medical records were evaluated for equipment and procedural

costs, type of procedure(s) performed, procedural time, complications, and outcome. **Results**: Total investment committed for the equipment loan including interest, extra supplies, and training is $58,397. Total amount of cash outlay at 6 months which includes the monthly lease cost: $8,535. Gross revenues of all procedures in the first 6 months totaled $22,169. Net revenues were $20,451. Projected time to cover initial investment based on the first 6 months assuming a static rate of procedures and net revenue would be approximately 17 months. Most common procedures performed were laparoscopic OVE/OVH (n=20) and video otoscopy-guided ear flush (n= 10). Other procedures performed include gastropexy, vaginoscopy, cryptorchid neuter, liver biopsy, diagnostic laparoscopy, and preputial explore and flush. Of the 14 client-owned laparoscopic OVEs that were performed, 5 of them were new clients who sought out the procedure on their own. Mean procedural time for the OVE was 67 minutes. No major complications occurred. All patients were discharged from the hospital the same day. Owner impressions of the laparoscopic procedures were all very favorable. **Conclusions**: Rigid endoscopy is feasible and cost effective in a new, single practitioner general practice if properly implemented. Patient outcomes and client response to the procedures are very favorable.

TWO-PORTAL LAPAROSCOPIC OVARIO-HYSTERECTOMY IN DOGS: FEASIBILITY IN NORMAL AND PATHOLOGIC CONDITIONS

Andrea Pievaroli DVM, Francesco Semeraro DVM

The Author wants to consider some objective variables that affect the difficulty and feasibility of the laparoscopic-assisted two-portal ovario-hysterectomy technique, performed both in normal conditions and for treatment of ovarian and uterine disease. In addition to weight and BCS, we consider the morphologic shape of the patient (breed) and the size of the uterus or the ovary. The height of the abdomen must be adequate to allow a good lifting and hooking of the ovary, in order to better locate the suspensory ligament to cauterize and resect. This length, put in relation to the diameter of the uterine horns, provides a value that is determinant in the choice of the technique used (laparoscopic or traditional). Larger sizes of the uterine horns in relation to the height of the abdomen, result in an exponential increase in surgical difficulty. Excessive length of the abdomen in relation to the height of the abdomen, cause more difficulty with respect to the maneuvers of handling and cauterization because the endoscopic forceps introduced into the caudal portal are maneuvered with greater difficulty, since the angle useful for the movements will be reduced. The use of mathematical formulas is only indicative and are not intended to substitute the decision-making skills of the surgeon who, with his experience, will have to perform an objective assessment of the clinical case to choose the type of surgery more appropriate for the patient.

Thoracoscopic lung biopsy IN HEALTHY AND CHRONIC RESPIRATORY DISEASE IN SWINE

POGGIANI, F. M.[1] ; SILVA, M. A. M.[2]; GERING, A. P.[3]; CANOLA, J. C.[4]
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Lung biopsy is an important tool for diagnosis of respiratory diseases. However, small samples often provide histological evaluation unclear. The aim of this study was to verify feasibility of lung biopsy and histopathology by *endoloop* endoscopic suture technique on healthy and respiratory disease in pigs. Forty Landrace pigs, among males and females, 4-8 weeks old were included. After inhalatory anesthesia, pigs were maintained in left decumbency and accesses were made on 9th intercostal space for the endoscope and 8th and 7th intercostal spaces for introduction of laparoscopic instruments. *Endoloop* suture was performed externally to the body cavity with no absorbable synthetic suture and then, coupled to the stick pusher of nodes was introduced into the chest cavity. Distal portion of the right diaphragmatic lung lobe was seized and pulled while the node was completed. After section above the suture, a sample was obtained and removed from the chest cavity. Biopsy site was surveyed before chest closure and restoration of negative intrathoracic pressure was performed. Suture showed no bleeding, lung was reexpanded and no chest drains were left in postoperatively. Samples of lung tissue of 40 animals showed enough material for histological analysis. Surgical time ranged from 15 - 20 minutes and there were no deaths in a period of ten days after the procedure. Lung biopsy by thoracoscopy using endoscopic suture *endoloop* technique was easy to perform, with a reduced surgical time and also was effective in providing lung samples from healthy and respiratory disease in pigs.

Thoracoscopic vs classic trans-diaphragmatic pacemaker IMPLANTATION: comparative study in 4 cases

Stéphane Libermann, DVM Centre Hospitalier Vétérinaire des Cordeliers,
Meaux, France

Objective : To demonstrate feasability of thoracoscopic implantation (TI) of a pacemaker lead and to compare TI with the trans-diaphragmatic approach (TDA) previously described.

Design : Prospective case serie

Animals : Dogs necessitating pacemaker implantation were included.

Procedure : Dogs were randomly assigned to group 1 (TDA) or group 2 (TI). In group 1

the procedure was performed as described previously. In group 2 dog were placed in dorsal recumbancy, a 5mm telescope was inserted through a paraxyphoid access, the operating instruments were inserted ventrally at the level of the 6th intercostal space on the right and the left side (right 5mm, and left 15 mm sheath). The pericardium was incised ventrally and retracted to the left side. The lead was inserted with a probe through the 15mm sheath, the pigtail of the lead was screwed in the epicardium. Data included surgical time and intra and postoperative complications.

Results : Surgical time was 46' and 43 ' in Group 1, 44' and 26' in Group 2. We had one major complication in group 2, consisting in pigtail loss, corrected by thoracoscopic reimplantation. This complication is not due to the thoracoscopic root. We had no minor complication. At the time of the writing, all dogs were free of cardiac symptoms.

Conclusion : Thoracoscopic pacemaker lead implantation was successful in 2 cases.

Clinical Relevance : Pacemaker lead can be successfully implanted by thoracoscopy.

Clinical application of thoracoscopy for intracavity chemotherapy in 4 dogs with mesothelioma

Kazushi Asano, DVM, PhD, DJCVS; Kenji Teshima, DVM, PhD; Kumiko Ishigaki, DVM; Mamiko Seki, DVM, PhD; Seri Komazaki, DVM; Rikiya Nishimura, DVM; Kazuya Edamura, DVM, PhD, DJCVS; Yoshiki Yamaya, DVM, PhD.

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For the definitive diagnosis of mesothelioma, biopsy sampling of pleura, peritoneum, or pericardium is needed. Thoracoscopy is less invasive for the biopsy sampling in dogs with pleural or pericardial mesothelioma compared with conventional exploratory thoracotomy. The objective of this report was to present the thoracoscopic biopsy and pericardiectomy and the subsequent intracavity chemotherapy via the thoracoscopic-assisted chest tube in 4 dogs with pleural and/or pericardial mesothelioma.

Dog #1 was a mongrel with the pericardial effusion. Dog #2 was a Golden retriever with the pleural, pericardial and peritoneal effusion. Dog #3 was a Shih Tzu with the pericardial effusion. Dog #4 was a Shiba with the pleural and peritoneal effusion. Thoracoscopy alone was performed in Dogs #1 and #3, and thoracoscopy and laparoscopy were done in Dogs #2 and #4. Thoracoscopic pericardiectomy was performed in Dogs #1, #2 and #3. Following the thoracoscopic biopsy, the chest tube was placed under the thoracoscopic guidance. In Dog #4, the reservoir system was implanted from subcutes into the chest for the intrapleural chemotherapy. Carboplatin, doxorubicin, cisplatin, paclitaxel, and/or lymphokine-activated killer cells were used for the intracavity administration in each dog. The palliative effect of intracavity effusion was observed in

all dogs. The survival time was 315, 319, 296, and 545 days in Dogs #1, #2, #3, and #4, respectively.

Thoracoscopic technique is suggested to have several advantages of less invasive sampling for histopathological diagnosis, simultaneous pericardiectomy, and the placement of the chest tube or reservoir system for intracavity chemotherapy in canine mesothelioma.

Thoracoscopy on diagnostic approach of an intrathoracic myxosarcoma in a young dog

Sabrina dos Santos Costa[1]; Sabryna Gouveia Calazans[2]; Thiago Demarchi Munhoz[3]; Tiago Ladeiro Almeida[4]; Franco Metzker Poggiani[5]; Mirela Tinucci Costa[6]; Cíntia Lucia Maniscalco[6]
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Myxosarcoma is a malignant neoplasm of fibroblastic origin. It occurs especially in skin and less frequently in the spleen, mesentery, spinal canal, heart, eyes, brain and column. An eighteen months old male Labrador Retriever was presented at the Veterinary Teaching Hospital of Sao Paulo State University, due to dyspnea, cyanosis and anorexia for four days. Cardiopulmonary auscultation revealed muffled heart and lung sounds. Right lateral and ventrodorsal thoracic radiographs revealed bilateral pleural effusion and a thoracic mass. Thoracentesis was performed on the seventh right intercostal space, and one liter and four hundred milliliters was obtained. Thoracoscopic examination was conducted for visualization and biopsy of the mass for subsequent histological examination. Two masses in right chest wall were observed (figure 1). A biopsy forceps was inserted and samples were collected for histopathological examination, which revealed neoplastic proliferation of mesenchymal origin. Neoplastic cells exhibited little cytoplasm and oval nucleus delimited, often elongated and slightly basophilic. Histopathological examination established the definitive diagnosis of myxosarcoma. After thirty days, the animal had sudden death and the owner did not allow necropsy to be performed. Clinical cases in the literature report myxosarcoma in dogs between 6 and 14 years. However, in this case, tumor occurred in a young animal. Despite chemotherapy, the animal did not improve and had a shorter survival rate than that reported on previous studies. Authors highlight the importance of endoscopic evaluation in establishing the definitive diagnosis of thoracic malignancies, since this procedure is minimally invasive; causes less pain and shorter recovery time.

Effect of one-lung ventilation with or without low-pressure carbon dioxide insufflation on cardiorespiratory parameters in cats undergoing thoracoscopy.

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Working space for thoracoscopic interventions is severely limited in cats and small dogs. In humans, a combination of one-lung ventilation (OLV) and low-pressure CO_2 insufflation (CDI) has been used for pediatric thoracoscopic procedures.
The aims of this prospective randomized study were to document a technique for OLV in cats and to evaluate the effect of low-pressure CDI in addition to OLV (OLV-CDI) on cardiorespiratory parameters in cats.
General anesthesia was induced in 6 healthy male cats using a standardized anesthetic protocol. A thermodilution catheter was placed via the jugular vein into the pulmonary artery using fluoroscopic guidance. OLV was induced using an endobronchial blocker placed into the right or left mainstem bronchus in randomized order using bronchoscopic guidance. Cardiorespiratory parameters were measured for 30 minutes after induction of OLV and subsequently for a further 30 minutes after initiation of OLV-CDI at intra-thoracic pressures of 3mmHg.
OLV was successfully achieved in 5 of 6 cats although technical difficulties were common. No significant effects on hemodynamic parameters or oxygen delivery were seen after right or left-sided OLV alone or after OLV-CDI. Oxygen delivery was significantly lower after L-OLV-CDI compared to R-OLV-CDI and in two cats, severe desaturation occurred after L-OLV-CDI prior to the 30 minute timepoint.
OLV can be used in cats for thoracoscopic interventions. Right-sided OLV-CDI was relatively well tolerated compared to left-sided OLV-CDI and may be used with care in cats.

Evaluation of short-term outcome after video-assisted thoracoscopic lung lobectomy for resection of primary lung tumors in medium to large breed dogs.

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A video-assisted thoracoscopic (VATS) approach for lung lobectomy is a standard of care procedure for resection of many primary lung tumors in humans and has been described in a small number of canine patients.[1]
The aims of this study were to describe the clinicopathological features of dogs undergoing VATS lobectomy for resection of primary lung tumors and to compare short-term outcome of VATS lobectomy with open thoracotomy (OT).
Medium to large-breed dogs undergoing either VATS (n=22) or open thoracotomy (n=24) were included. A 3-port technique was used in 12 dogs and 4 ports were used in 10 dogs. One-lung ventilation was employed in all VATS cases. Tumor volumes were calculated from pre-operative computed tomography scans where available.
Two of 22 dogs (9%) were converted from a VATS to an OT approach. All dogs were discharged from the hospital. There was no significant difference between VATS and open lobectomy with regard to major complication rate, time to discharge, time in intensive care, or in completeness of resection. Surgery time was significantly longer for VATS lobectomy (median 120 minutes, range 70-170 minutes) than OT lobectomy (median 95 minutes, range 60-135 minutes).
VATS lobectomy has a low conversion and complication rate in medium to large breed dogs. Short-term morbidity of VATS lobectomy was comparable to OT for resection of primary lung tumors in dogs.

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Thoracoscopic diagnosis and treatment for recurrent pneumothorax secondary to penetrating trauma.

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Thoracoscopy was utilized in this case both as a diagnostic and as a treatment modality for intrathoracic and transdiaphragmatic porcupine (*Erethizon dorsatum*) quill impalement necessitating lung lobectomy.
A 3yr old, male intact Pit Bull (27kg) presented for evaluation of dyspnea. The patient had been impaled by porcupine quills approximately 60h prior to presentation at which time, his owners had removed all observable quills, many of which were located on the left thoracic wall. Approximately 48 hours later, the patient became tachypneic and tachycardic. Orthogonal view radiographs revealed mild to moderate pneumothorax, pleural effusion, and consolidation of the left cranial lung lobe. Transthoracic quill migration was presumptively diagnosed.
Thoracoscopic exploration revealed a porcupine quill within the left cranial lung lobe and a 2nd quill within the pulmonary artery of the left cranial lobe with associated atalectasis. The quill within the left cranial lobe was removed using thoracoscopic forceps and traction. A 45mm linear stapling device was used to perform a left cranial lobectomy removing the 2nd quill and lung lobe en bloc. A 3rd quill was found migrating

through the left crus of the diaphragm. The quill was removed using traction. A chest tube was placed post operatively and removed 12 hours following placement when all residual pneumothorax had ceased.
Telephone follow up 8 weeks post operatively showed full return to previous activity level with no post op complications.
Thoracoscopy can be an effective modality for the diagnosis and treatment of recurrent pneumothorax secondary to penetrating trauma.

Arthroscopic diagnosis of extracapsular crimp migration to an intra-articular position

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A 6yr female spayed Cavalier King Charles Spaniel was presented for evaluation of persistent right pelvic limb lameness subsequent to lateral fabello-tibial suture stabilization of a cranial cruciate deficient stifle two years previously. An acute exacerbation of lameness had been noted 2 weeks prior to presentation.
Orthopaedic examination revealed minimal cranio-caudal instability elicited on full extension only, pain noted on full extension, and an audible 'pop' on flexion and extension through a normal range of motion of the right stifle.
Orthogonal view radiography revealed marked progressive osteoarthritic changes as compared to immediate post-operative radiographs.
Arthroscopic examination of the right stifle revealed severe synovial proliferation, no meniscal pathology, a well circumscribed Modified Outerbridge Grade IV cartilage erosion focally along the disto-lateral femoral condyle, lateral tibial plateau, and an associated suture crimp in the lateral compartment of the joint. The crimp and associated suture material were removed and submitted for bacterial culture and sensitivity.
Following implant removal, minimal cranio-caudal instability was noted intraoperatively and therefore no further stabilization surgery was performed.
Clinical follow up at 2 weeks postoperative revealed a subsidence of clinical lameness and a greatly increased activity level. Return to pre-cruciate injury activity level with a mild transient stiffness immediately after prolonged periods of rest was noted on 8 week postoperative telephone follow up.
This case marks, to the authors knowledge, the first reported case of crimp migration from an extracapular position through the lateral joint capsule and into an intracapsular position.

Articular cartilage lesions of the patellofemoral joint in dogs with naturally occurring cranial cruciate ligament disease

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Cranial cruciate ligament (CCL) disease is the leading cause of degenerative change in the canine stifle. This study evaluated the frequency, severity, and location of patellofemoral (PF) osteoarthritis (OA) in dogs with naturally occurring CCL disease. Arthroscopic video recordings and radiographs were performed in 44 stifles. Cartilage pathology was scored at 3 locations (proximal, middle, distal) in the trochlear groove and patella. A radiographic OA and synovial pathology score were assigned. A Kruskal Wallis test was used to determine if lesion severity varied by site, synovitis, and OA, and the Dunn's test was used for pairwise comparisons. $p<0.05$ was considered statistically significant. Cartilage pathology and synovitis were identified in all PF joints. The proximal trochlear groove had significantly higher cartilage scores than the middle and distal sites. The middle trochlear groove site was significantly greater than the distal. The distal patella had significantly greater scores than the middle and the proximal patellar locations. Cartilage scores were significantly greater in stifles with higher synovitis scores, and radiographic OA, tibial sclerosis, and patellar osteophytosis scores. In conclusion, dogs with CCL disease have a high incidence of PF cartilage pathology. The severity of cartilage lesions varied depending on location within the joint and are consistent with biomechanical alterations reported in canine cadaver stifles after experimental transection of the CCL. PF OA may lead to significant deleterious effects in clinical outcomes of dogs with CCL disease and therefore restoration of PF biomechanics should be considered in the treatment of CCL disease.

Arthroscopic Surgery in Dogs - Is it worth the trouble and expense?

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Arthroscopic surgery in dogs is commonly performed in the shoulder, elbow, stifle and tarsus. Arthroscopy of the carpus and hip are also possible, but less frequently performed. Arthroscopy is used to make or confirm a diagnosis and surgically treat joint disorders. Advantages of arthroscopy include minimal morbidity, decreased operative time, magnification of joint structures, increased precision, ability to treat multiple joints at the same time and visual documentation of articular structures. Initially arthroscopy requires additional time due to the time required to set up the operating room and the time required to perform arthroscopy when inexperienced. The surgeon must learn proper placement of the scope, instrument and egress portals. Triangulation must also be learned. This is a technique that involves the coordinated positioning of the scope and instrument within the joint. Triangulation is needed to ensure an adequate image and acceptable positioning of the hand instruments to allow surgical treatment of the problem. The set-up and surgical time decrease dramatically once the surgical team becomes experienced. Start-up equipment costs are significant, but these costs can be rapidly recouped by charging an extra arthroscopic fee. In addition, the ability to offer minimally-invasive surgery of the joints will most likely attract clients that may have otherwise used another facility performing traditional surgery.

Arthroscopic Instrumentation

Arthroscopy requires a light source, a digital camera (control box and camera head), monitor and scope. The optimal light sources are either LCD or xenon. The optimal camera system is 3 chip and high definition. The monitor should be high resolution. The most commonly used scope is 2.4 or 2.7 mm. Other scopes that are useful include a 1.9 and a 4.0 scope. A fluid pump or pressure bag is needed to deliver fluids through the scope cannula under pressure. The delivery of fluids into the joint distends the joint and eliminates bleeding and debris, thus providing a clear image. Fluids egress from the joint using an egress cannula or hypodermic needle.

Hand instruments for small joint arthroscopy must combine small diameter with excellent mechanics to provide accuracy while minimizing iatrogenic trauma and instrument failure. Basic recommended arthroscopic hand instruments include probes, grasping forceps, biting forceps, meniscal knives and a curette. Instrument cannulas can be used to facilitate use of hand instruments in the joint. Power shavers are designed to rapidly debride tissues. Most shavers permit variation of speed and direction including forward, reverse, and oscillation. Shaver blades come in numerous varieties that are designed for removal of either soft tissue or hard tissue. Electrocautery and radiofrequency are used to generate heat for cauterization of vessels, debridement of tissues, or shrinking of

collagen.

Patient preparation and positioning
Patients must be positioned properly for arthroscopic evaluation. Patients are typically positioned as follows for the specific joints:

Shoulder	lateral recumbency with surgical leg up (lateral aspect of shoulder)
Elbow	lateral recumbency with surgical leg down (medial aspect of elbow)
Carpus	ventral recumbency with foot hanging off front of table.
Hip	lateral recumbency with surgical leg up (lateral aspect of hip)
Stifle	ventral recumbency with stifle hanging off back of table.
Tarsus	ventral recumbency with foot hanging off back of table.

The hair should be clipped adequately at the surgical site. Ample clipping should be done to allow for comfortable placement of the arthroscope, instrument and egress portals. In addition, hair should be clipped accordingly to allow surgical treatment of any conditions found at the time of arthroscopic evaluation. Patients should be prepared with a sterile draping technique. Impervious drapes should be used due to prevent wicking of arthroscopic fluids through the drape to the skin.

Portal sites for stifle arthroscopy
The common portals used for arthroscopy include an egress portal, an arthroscope portal and an instrument portal. The egress portal is usually established first followed by the arthroscope portal and the instrument portal. The scope and instrument portals may be interchanged occasionally to gain better access or visualization to certain joint structures. Occasionally the egress portal is converted into the instrument portal once exploration of the joint is completed. The most common portals for each joint are as follows:

	Egress Portal	**Arthroscope Portal**	**Instrument Portal**
Shoulder	craniolateral	lateral	caudolateral
Elbow	caudomedial	medial	craniomedial
Carpus	craniomedial	craniolateral	craniomedial
Hip	craniolateral	lateral	craniolateral
Stifle	proximomedial	craniolateral	craniomedial
Tarsus	craniolateral	caudolateral	caudomedial

Joint examination and surgical anatomy
Systematic examination of the joints should be performed. It is often helpful to have an easily identifiable landmark in each joint to start the examination. This is often termed “home base”. The landmark chosen for the home base can be adjusted to the surgeons preference, but the arthroscopic examination should

always begin there and proceed in a systematic order. The author's recommended home base for the individual joints are:

	Home Base
Shoulder	medial glenohumeral ligament (MGHL)
Elbow	anconeal process
Carpus	radiocarpal bone
Hip	round ligament
Stifle	trochlear groove
Tarsus	medial trochlear ridge

The author performs a systematic arthroscopic examination of the joint in the following order:

	Systematic Arthroscopic Examination
Shoulder	MGHL, subscapularis, biceps tendon, humeral head, synovial membrane, glenoid, LGHL
Elbow	anconeal process, trochlear notch, LCP, LHC, radial head, MCP, MHC, MCL
Carpus	radiocarpal, ulnocarpal and accessory carpal bones, radiocarpal and ulnar carpal ligaments, radius
Hip	round ligament, acetabulum, femoral head, synovial membrane
Stifle	trochlear groove, trochlear ridges, patella, medial and lateral joint pouches, CrCL CdCL, lateral meniscus, lateral articular cartilage, medial meniscus, medial articular cartilage
Tarsus	medial trochlear ridge, medial tibia, lateral trochlear ridge, lateral tibia, fibula

Practical Tips to Get the Best Arthroscopic View

Successful arthroscopic evaluation cannot be performed unless the anatomic structures are readily visible. You can't treat what you can't see! The following factors should be addressed to improve the view of and access to anatomic structures within the joint:

1. Adequate fluid flow should be provided to distend the joint and flush debris and blood
2. Proper egress should be allowed to remove blood and debris and distend the synovial membrane
3. Use the largest diameter scope that comfortably fits in the joint to increase field of view and magnification
4. Adjust the distance between the scope and the target tissue to gain the needed view; moving the scope closer to the target magnifies the structure, but reduces the field of view.
5. Position the limb appropriately to optimize the view of the target structure. An assistant or joint distractor is required in many situations to obtain an adequate

view.
6. Use cautery as needed for hemostasis and to debride tissues.
7. Use a shaver to debride synovium and fat pad to improve visibility.
8. Manipulate the leg slowly and carefully during arthroscopy to prevent iatrogenic cartilage damage.
9. Use a probe to assess, retract and manipulate structures within the joint.
10. Use the light-post to adjust the arthroscopic view as much as possible. The scope is also moved to adjust the view, but this increases the chance of iatrogenic cartilage damage.
11. Do not use cautery on the cartilage surface.

Arthroscopy of the Shoulder
Indications for arthroscopic shoulder surgery include treatment of osteochondritis dessicans (OCD), bicipital tendon injury, collateral ligament injury (MGHL, LGHL), and diagnosis of cuff muscle injury (supraspinatous, subscapularis). OCD is the most common indication for shoulder arthroscopy. Identification and removal of the cartilage flap is fairly easily performed and had very low morbidity. In addition, arthroscopy allows identification of displaced cartilage fragments in the cranial and medial joint space. Shoulder instability is becoming more frequently diagnosed in dogs. Arthroscopy is an important tool for the diagnosis of shoulder instability. Arthroscopic visualization allows the surgeon to assess the integrity of the MGHL, LHGL, subscapularis and joint capsule. Based on the arthroscopic findings, the surgeon can determine the course of treatment.

Arthroscopy of the Elbow
The use of arthroscopy for treatment of developmental and degenerative processes of the canine elbow has become more popular recently in part due to advancements in equipment and techniques. Benefits of arthroscopy include minimal invasiveness, low morbidity, outstanding joint visualization, and decreased operating time. The use of arthroscopy for treatment of fragmented coronoid process and osteochondrosis dessicans has become routine. Other applications include management of ununited anconeal process, therapy of osteoarthritis, and endoscopic assisted fracture reduction. Successful use of arthroscopy requires a thorough understanding of the equipment available and its proper application.

Arthroscopy of the Stifle
Stifle arthroscopy is most commonly performed for cranial cruciate ligament disease or meniscal injury. Arthroscopy of the stifle is extremely useful for diagnosis of partial tears of the cranial cruciate ligament (CrCL) and meniscal tears. Many of these tears are not visible by the naked eye. The magnification provided by the scope allows more accurate diagnosis and more precise treatment. The scope can be used to debride the torn CrCL fibers, perform partial meniscectomy or meniscal release. OCD lesions can also be removed and the subchondral bed treated with curettage or microfracture. The use of arthroscopy

allows TPLO an extracapsular CrCL injury to repaired using minimally-invasive technique.

Arthroscopic Assisted Arthrotomy

Traditional arthrotomy provides a level of comfort to the surgeon but sacrifices the benefits of arthroscopy. Consideration should be given to implementing arthroscopy at the time of arthrotomy to enhance surgical view, improve surgical treatment and assist in arthroscopic training. Arthroscopy can be combined with a mini-arthrtotomy to realize the benefits of precise treatment and decreased morbidity noted with arthroscopy alone. Combining procedures is easier to perform for the surgeon just learning to perform arthroscopy. An arthroscope can be introduced into the arthrotomy to noticeably augment the view of the patella, trochlear groove, femoral condyle, tibial plateau, CrCL, caudal cruciate ligament and the menisci. Advantages of using an arthroscope through an arthtrotomy compared to traditional arthroscopic technique include the ability to use the arthrotomy incision for all three portals (egress, scope, and instrument portals), a dramatic shortening of the arthroscopy learning curve and a decreased chance of developing fluid extravasation into the soft tissues. Additionally, arthroscopic-assisted arthrotomy decreases post operative pain, facilitates earlier return to function, and improves visualization which allows more precise and accurate treatment. The arthroscope can be quickly and easily moved in and out of the joint as needed. The arthroscope can be positioned in the desired location by gross observation, while the anatomic structure of interest can be assessed more completely using the magnification and enhanced viewing field provided by the arthroscope. Instruments used to the primary condition can be inserted adjacent to the scope through the same arthrotomy incision. Triangulation, an arthroscopic skill that is difficult to learn, in no longer a problem because surgical instruments can be applied to the target tissue under gross observation. The arthroscope is then positioned next to the instrument to allow a magnified view while treatment of the damaged tissue is performed. Over time, the surgeon will improve their arthroscopic skills to the point where arthrotomy may no longer be needed.

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Short-term outcome of laparoscopic splenectomy in eight dogs

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Splenectomy in canine patients is commonly performed for splenic mass lesions; other indications include torsion, infarction, and immune-mediated disease. In veterinary medicine, splenectomy is typically performed through a ventral midline laparotomy; however, laparoscopic splenectomy is routinely performed in human medicine.

Dogs that underwent laparoscopic splenectomy were retrospectively identified. Data recorded included signalment, weight, port number, size and location, positioning, additional procedures performed, duration of surgery and anesthesia, histopathological diagnosis, duration of hospitalization, and perioperative complications.

Eight laparoscopic splenectomy cases were identified; these procedures were performed for diagnosis and treatment of mass lesions or diffuse splenic pathology. Surgery was performed in medium to large breed dogs with a median weight of 30.7 kg (range 20.2-46 kg) utilizing a three port technique (n=7) or a four port technique (n=1). Positioning varied in part due to additional laparoscopic or laparoscopic-assisted procedures performed at the time of surgery, which included adrenalectomy (n=2), ovariectomy (1), gastropexy (1), and intestinal resection and anastomosis (1). The splenic hilus was dissected using a vessel-sealing device in all cases. The spleen was recovered through an enlargement of the ventral midline incision in all cases. No cases were converted to an open approach and the only perioperative complication noted was mild hemorrhage from an omental vessel in one case.

Laparoscopic splenectomy was associated with little perioperative morbidity and few complications in this cohort of dogs, making this a potentially viable technique to consider in cases of elective splenectomy without hemoabdomen or massive splenomegaly.

Biomechanical Analysis of Laparoscopic Incisional Gastropexy with Intracorporeal Suturing Using Knotless Polyglyconate

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Objective: To evaluate the load to failure of laparoscopic incisional gastropexy with intracorporeal suturing utilizing knotless polyglyconate.

Study Design: Cadaveric study.

Sample Population: Twelve canine cadavers were used.

Methods: An incisional gastropexy with two strands of knotless polyglyconate was performed with laparoscopy in 6 dogs and with an open approach in 6 dogs. The length of the gastropexy, the number of suture bites on each side of the gastropexy, as well as the number of inadvertent full thickness gastric suture bites were recorded. Load to failure was measured.

Results: Load to failure was 46.5 ± 19.7 N for the open approach and 69.0 ± 26.0 N for the laparoscopy group (P = 0.123). The length of the incision on the stomach (P = 0.353) and the abdominal wall (P = 0.553), were 3.1 ± 0.1 cm and 3.1 ± 0.2 cm, respectively, for the laparoscopy group and 3.0 ± 0.2 cm and 3.0 ± 0.2 cm, respectively, for the open approach group. There was no significant difference between groups in the number of suture bites medially (P = 0.448) or laterally (P = 0.363). Three gastric intraluminal sutures were found for the laparoscopic group and none were found in open approach group (P = 0.023).

Conclusion: Incisional gastropexy performed with laparoscopic intracorporeal suturing and knotless polyglyconate has a load to failure that is comparable with an open method. The load to failure is similar to previously reported values for incisional gastropexy.

Initial Experience Utilizing V-Loc™ suture for Total Intracorporeally Sutured Laparoscopic Gastropexy in Dogs

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Background: Total laparoscopic sutured gastropexy has been described in dogs utilizing either the intracorporeally hand sutured technique or a suture-assist device (Endostich). To aid surgeons during laparoscopic suturing, a novel type of intracorporeal absorbable barbed suture (V-Loc, TM 90, Covidien, Mansfield, MA) has been recently introduced. This suture was initially developed as a skin closure device with self-anchoring barbs and loops that obviate the need for knot tying. Recent reports have shown this suture's effectiveness in advanced human abdominal laparoscopic procedures. Here we describe the operative technique and present the initial experience using V-Loc for a total intracorporeally sutured laparoscopic gastropexy.
Methods: A total of 9 dogs underwent a V-Loc laparoscopic gastropexy (VLG) by an experienced laparoscopic surgeon familiar with alternative sutured gastropexy techniques. All procedures were performed utilizing three 5mm trocars and a 5mm 30 degree telescope.
Results: Median patient age was 712 days (range, 242-3157 days), and median patient weight was 48 kg (33-70 kg). Median procedure time from the start of the skin incision to the last suture placement of the laparoscopic port was 115 min (range, 60-180 minutes). Although there were no complications with any of the procedures, technical challenges existed in initially identifying the optimal location of abdominal port placement.
Conclusion: Utilizing V-Loc suture for total laparoscopic gastropexy is safe and feasible. Further studies are needed to evaluate the differences in surgery time and pexy strength to other previously described methods.

Combination of interventional radiology and laparoscopy for treatment of an extrahepatic portosystemic shunt in 2 dogs.

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Surgical attenuation including ligation, cellophane banding and ameroid constrictor placement is the treatment of choice in canine extrahepatic portosystemic shunt (PSS). Percutaneous transvenous coil embolization (PTCE) is also reported for the successful treatment of PSS in dogs, and has a great advantage of less invasiveness without laparotomy. However, PTCE doesn't provide the hepatic pathological changes. The objective of this report was to present the combination of PTCE and laparoscopic liver biopsy and ovariohysterectomy in 2 female dogs with PSS.

Two intact female dogs (Papillon and Jack Russell Terrier) were referred for suspicious PSS. An extrahepatic left gastric-phrenic shunt was detected by CT angiography in each dog. A balloon catheter was inserted into the sheath introducer placed in the jugular vein, and advanced into the shunt vessel. Transvenous portography and measurement of portal pressure were performed, and embolization coils were implanted into the shunt vessel. Laparoscopic liver biopsy and ovariohysterectomy were performed following the PTCE. The hepatic histopathology didn't show the fibrosis and microvascular dysplasia in 2 dogs. No complications were observed, and the complete attenuation was achieved in each dog.

In this report, laparoscopy could supplement the disadvantage of PTCE and had an advantage that ovariohysterectomy could be performed at the same time. The temporary occlusion with balloon dilation was available for the evaluation of the portal pressure rise. Laparoscopic gross changes of abdominal organs and transvenous portography with balloon dilation are suggested to be useful for the treatment of PSS by interventional radiological or laparoscopic attenuation of shunt vessel.

Use of a Vessel Sealant Device for Cystic Duct Ligation in the Dog

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Objective- To compare the use of a vessel sealant device to hemostatic clips for cystic duct ligation in a canine cadaveric model.

Sample Population- Cadaveric canine hepatobiliary systems

Methods- Hepatobiliary systems were harvested from normal dogs. A microtip pressure transducer was inserted into the common bile duct. A 20-24 gauge intravenous catheter was placed in a hepatic duct. The cystic duct was ligated with one of three techniques: vessel sealant device (VSD), 10 mm medium Endoclips™, or 10 mm large Endoclips™ with 6 samples in each group. Methylene blue was infused until failure. Failure was recorded as seal/clip failure or retrograde movement of methylene blue into the liver. One way ANOVA was used to analyze failure pressures with Student's t-test.

Results- Mean failure pressure of the medium endoclip group was significantly lower than the large endoclip group (P=0.014, Figure 1). There was no difference between the failure pressure of the VSD group and the medium and large endoclip groups (P=0.097, P=0.34; respectively). Failure by leakage at the cut surface of the cystic duct occurred in two samples in the medium endoclip group while all other samples within the three groups failed by retrograde flow of the methylene blue through the hepatic ducts into the liver parenchyma.

Conclusions- The vessel sealant device appears comparable to large endoclips for closure of the cystic duct in an acute cadaveric model, while medium endoclips may not fully span the diameter of a cystic duct in large breed dogs and leak at lower pressures.

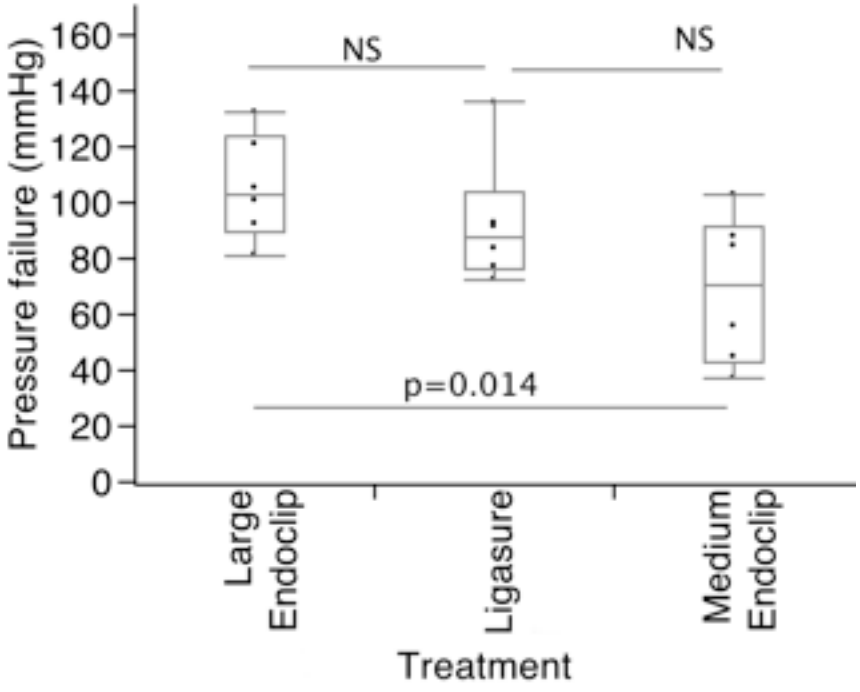


Figure 1: Box plot displaying the failure pressure for each technique

Botulinum toxin A treatment for delayed gastric emptying in a dog.

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CASE DESCRIPTION: A five-year-old spayed female toy Australian Shepherd was referred for septic abdominal effusion following excision of a biliary mucocele.
CLINICAL FINDINGS: Based on serum chemistry and cytology, the patient was diagnosed with bile peritonitis. She subsequently developed delayed gastric emptying that was refractory to prokinetic therapy.
TREATMENT AND OUTCOME: Botulinum Toxin A was injected into the muscularis layer of the pylorus to induce relaxation of the pylorus trough a laparoscopy-assisted approach. The delayed gastric emptying resolved three days after treatment with Botulinum Toxin A. The patient was euthanized 10 days following the procedure following development of necrotizing pancreatitis.
CLINICAL RELEVANCE: While the use of Botulinum Toxin A for the treatment of delayed gastric emptying has been reported in human literature, this is the first reported case of its use in dogs.

COMPARISON OF ABDOMINAL PNEUMOPERITONEUM VOLUMES IN LIFT LAPAROSCOPY WITH VARIABLE LIFT LOCATIONS AND TENSILE FORCE

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Objective: To define the optimal lifting location and tensile force using a laparoscopy lift device.
Sample Population: Twelve fresh cadaveric dog specimens, median body weight (BW) 32.5 kg (range 5-60 kg).
Methods: Specimens underwent an abdominal CT scan for each of each of six lifting treatments: 1) no lift, 2) umbilical lift location with 15% BW tensile force, 3) umbilical lift with 20% BW, 4) umbilical lift with 25% BW, 5) caudal lift location with 15% BW, and 6) both umbilical and caudal lifting with 15% BW shared between both devices. Volume of pneumoperitoneum was measured for each CT scan and normalized to the total abdominal volume of the dog.
Results: A significantly larger pneumoperitoneum was produced with each increase in tensile force using the umbilical lift site. Lifting at both sites simultaneously produced significantly more pneumoperitoneum than either site individually, with 15% BW tensile force, but was not significantly different than that produced with 20% and 25% BW at the

umbilical lift site. Caudal lifting alone produced a markedly smaller pneumoperitoneum than other treatments.
Conclusion: Significantly larger volumes of pneumoperitoneum can be produced with increased tensile force, or with dual lifting sites at lower force. A caudal lifting site leads to a small pneumoperitoneum and may be less clinically useful unless targeting caudal abdominal structures.

VIDEO-GAMING ABILITY IS PREDICTIVE OF LAPAROSCOPY SKILLS IN THIRD YEAR VETERINARY STUDENTS

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Objectives:
Determine the association between video-gaming ability and laparoscopic, spatial orientation, and traditional surgical skills.
Design:
Prospective, randomized, controlled study utilizing a convenience sample.
Sample Population:
Twenty-nine volunteer (17 female, 12 male) Purdue University third year veterinary students (IRB#1208012553).
Methods:
None of the test subjects had previously played the test video games or had laparoscopy experience. Subjects played 3 video games; scores were recorded for each game. Three procedures that simulated laparoscopic surgical skills were evaluated using box trainers. The Purdue University Visualization of Rotations Spatial Test was used to evaluate 3D skills. Four traditional surgical skills were evaluated by recording the time for successful completion. Associations between summary scores were analyzed using Spearman's rank correlation coefficient (rs) and $P < 0.05$ was considered significant.
Results:
A positive correlation between the summary score for the 3 video games and the summary score for laparoscopic skills ($rs = +0.40$, $P = 0.031$) was found. In contrast, summary scores for traditional surgical skills were not associated ($P = 0.61$) with video game performance. Spatial analysis skills were positively ($rs = +0.30$), but not significantly ($P = 0.11$), associated with video game performance. Traditional surgical skills were not associated with laparoscopic skills ($rs = +0.25$; $P = 0.19$) or spatial analysis skills ($rs = -0.03$; $P = 0.88$).
Conclusions and Clinical Relevance:
Video game aptitude is predictive of laparoscopic skill, but not traditional surgical skills, in third year veterinary students. This finding suggests that laparoscopic skills can be improved by video game training.

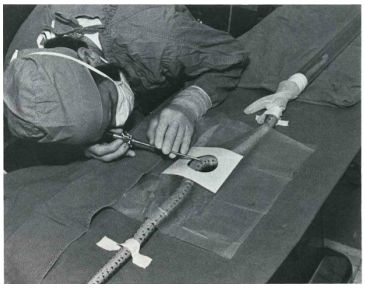
Advances in Equine Laparoscopy

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Washington State University, Pullman, WA

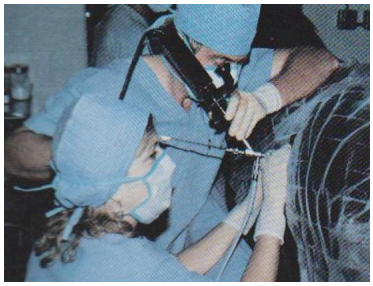
The idea of looking inside a living body is as old as the idea of medical science itself. The growth of laparoscopy as a clinical technique is closely harnessed to the economically accessible technology of the day. A major development that enabled the growth of laparoscopy was making the transition from direct endoscopic viewing to video-endoscopy with viewing the surgical area via a monitor.



Witherspoon 1980

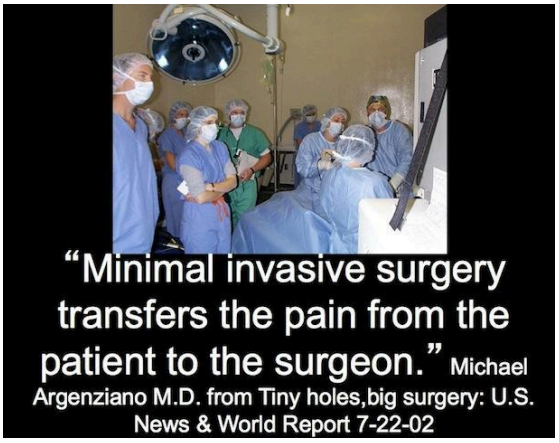


Bush 1980



Wilson 1983

Advancements made in the areas of laparoscopic imaging and instrumentation which enables more complex surgical procedures, have ushered the need for specialized laparoscopic skill training.





To best appreciate the “state of the art” of equine laparoscopy today and where it can go tomorrow requires understanding the historical unfolding of endoscopy. To develop perspective of the challenges that have been overcome and those yet to be solved, as well as the “real” limitations of laparoscopy is to have properly started ones education at the beginning. When looking at the timeline of the development of equine laparoscopy or endoscopic surgery in general it is easy to get sidetracked by the “who did what first” debates. To paraphrase an old saying, “success has a thousand parents and failure is but an orphan”. A truth is that we all stand on the shoulders of those that have come before us and we now have opportunity and access to technology that those before us lacked. This pattern will continue to be repeated and informs surgeons to maintain both diligence and humility.

One of the earliest reported uses of diagnostic laparoscopy in the horse was from Germany by Tarasevic in 1927. It was more than 40 years before the next publications appeared from the works of Heinze in Germany and Witherspoon in the USA. Another way to gauge the timeline and progress in Equine Laparoscopy is looking at veterinary books dedicated to Laparoscopy. The first appearance of a veterinary laparoscopy text is “Animal Laparoscopy” in 1980. There was one 11-page chapter covering equine laparoscopy. Two more decades would pass before a complete book on “Equine Diagnostic and Surgical Laparoscopy” was produced in 2002. It only took a decade for the next book on “Advances in Equine Laparoscopy” to be published. It would not be surprising to see that interval halved again for the next equine laparoscopy text.

1980 2002 2012

Laparoscopy is a useful diagnostic tool to evaluate the abdominal cavity as well as an operative technique with a growing list of surgical procedures. The diagnostic evaluation is often aimed at making a specific diagnosis or determining prognosis of intra-abdominal disease. Direct viewing of the

abdominal cavity using laparoscopy offers the clinician visual access to areas that normally cannot be seen using celiotomy techniques (e.g. epipoloic foramen, nephrosplenic ligament, duodenum etc.). This visual access permits direct assessment of abdominal viscera, which often is more informative and accurate than secondary imaging or diagnostic techniques. In addition to increased diagnostic and prognostic ability, laparoscopy also is used to provide therapeutic intervention of intra-abdominal disease. A balanced diagnostic approach that uses laparoscopy in addition too clinical and laboratory methods offers the greatest opportunity for accurate diagnosis, prognosis and treatment.

There is a need for the clinician to have a clear understanding of the caveats of laparoscopy. For any meaningful examination of and/or operations within the abdominal cavity to take place adequate free space between the viscera and body wall must exist. For this reason laparoscopy is rarely indicated in horses with significant abdominal distension. Adequate viewing cannot be achieved without adequate room inside the abdominal cavity.

When the intestines are distended with ingesta or gas adequate pneumoperitoneum cannot be established. The more free space available in the abdominal cavity the greater the viewing potential and the lower the intra-abdominal pneumoperitoneum inflation pressure that is needed. Lower intra-abdominal inflation pressures translate to less pain and better cardio-respiratory function of the horse.



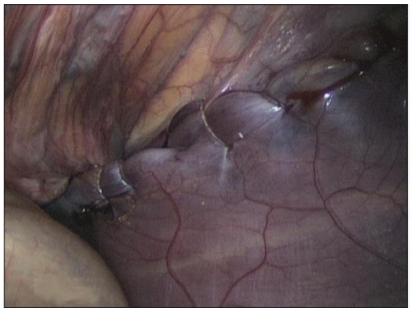
Another consideration is that standing laparoscopy should be approached very cautiously in any horse in which diaphragmatic hernia may be a differential. The potential for creating a pneumothorax must be appreciated in such horses.

It is also important to note that complete examination of all intra-abdominal viscera and surfaces cannot be achieved. It is an axiom of laparoscopy that "what you see, you see but what you don't, you don't." Added to that is, "if you don't look you will never see". Laparoscopy of the standing horse offers the best viewing of the dorsal aspect of the abdominal cavity while the ventral aspects are best viewed using a ventral abdominal approach with the horse in dorsal recumbency and using tilting of the surgical table as needed. Finally it needs highlighting that performing exploratory laparoscopy on horses will affect subsequent peritoneal fluid parameters. These have been reported as an increase in mean leukocyte counts (mean leukocyte count 31, 960/uL) and protein concentrations (mean 2.5 g/dL) of peritoneal fluid within 24 hours. As a comparison abdominal fluid collected from ponies 24 hours after exploratory celiotomy had mean leukocyte counts of 137,857/uL and mean protein concentrations of 4.7g/dL 24 hours postoperatively. Peritoneal fluid cell counts

have been reported to peak about 5 days after celiotomy in normal horses. It is unknown how long peritoneal values take to return to preoperative values after celiotomy or laparoscopy. Operative complications directly related to diagnostic laparoscopy are low. The most common is minor punctures of the spleen and cecum or injury to the epigastric vessels during trocar placement. These complications are minimized by proper presurgical preparation of the horse and exercising care during portal placement.

Diagnostic laparoscopy has been performed in horses with chronic weight loss, chronic colic, intra-abdominal hemorrhage, and peritonitis and for diagnosing abdominal neoplasia, intestinal adhesions, and evaluating the reproductive tract. The laparoscope has been used to better view and evaluate rectal tears, rectal prolapses, mesocolic ruptures, gastric ruptures, abdominal abscesses, splenic hematomas, retroflexion of the large colon, vaginal and uterine tears, and uterine artery ruptures. An analysis of 105 diagnostic laparoscopies in the horse revealed an overall sensitivity of 75% for diagnosis of disease with a specificity of 18%.

Biopsy of the liver, spleen and kidney under laparoscopic viewing is also possible and allows selective sampling of abnormal areas. It may also allow for a larger and possibly more diagnostic specimen than is possible with a true cut or biopsy gun. Laparoscopy can be used following celiotomy to evaluate surgical results if they are in question (*e.g.*, integrity of an intestinal anastamosis or bowel viability). If a diagnosis indicates a need for surgical correction, laparoscopy may also be useful; many surgeries traditionally done via laparotomy or celiotomy can be performed laparoscopically, including removal of infected umbilical remnants, repair of ruptured bladders in neonatal foals, repair of inguinal herniation in stallions, cryptorchidectomy, ovariectomy, granulosa cell tumor removal, hernia repair, adhesiolysis, colopexy and removal of cystic calculi.



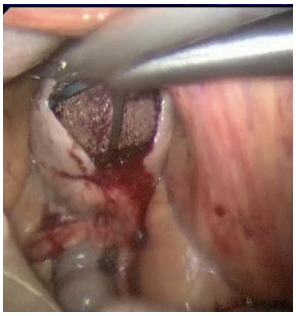
Barbed Suture



Ovary Morcellation



Vessel Sealing

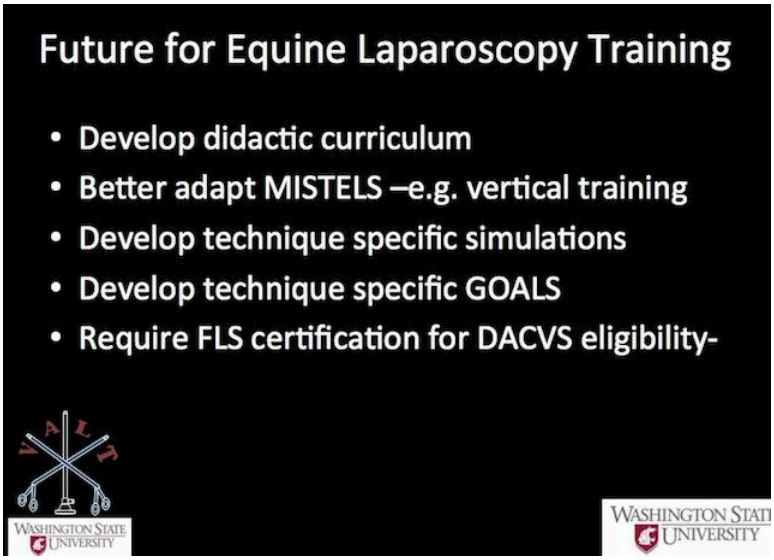


Urolith removal



suturing bladder

Equine laparoscopy is also used as an educational tool in improving transrectal palpation skills. A systematic and thorough approach to transrectal examination is necessary to assess normal as well as abnormal conditions in the abdominal cavity; accurate mental images of transrectally palpated structures are vital when evaluating conditions of the equine abdomen. A clinician cannot expand their palpation skills without a method to develop accurate mental images and the ability to link that visualization to a spatial orientation and tactile sense. Videolaparoscopy performed during transrectal palpation provides the opportunity to link visual, tactile and mental images of important structures in the normal equine abdomen. Structures that can normally be palpated transrectally and viewed with videoendoscopic imaging are: uterine body, uterine horn, ovaries, bladder, left and right inguinal rings, spleen, nephrosplenic ligament, left kidney, root of the mesentery, aorta, duodenum, small colon, base and ventral band of the cecum, and peritoneum. The left dorsal and left ventral colon and the pelvic flexure may or may not be palpable.



Selected Reading

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Dean A. Hendrickson, "A Review of Equine Laparoscopy," ISRN Veterinary Science, vol. 2012, Article ID 492650, 17 pages, 2012. doi:10.5402/2012/492650

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Equine Diagnostic and Surgical Laparoscopy, A. T. Fischer Jr., Ed., WB Saunders, Philadelphia, Pa, USA, 2002.

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Elbow portals

OCD flaps are removed easily using the scope

FCP of elbow

Meniscal tears can be difficult to see during routine arthrotomy. A probe is used to assess the meniscus and find a meniscal tear

Arthroscopic-assisted arthrotomy