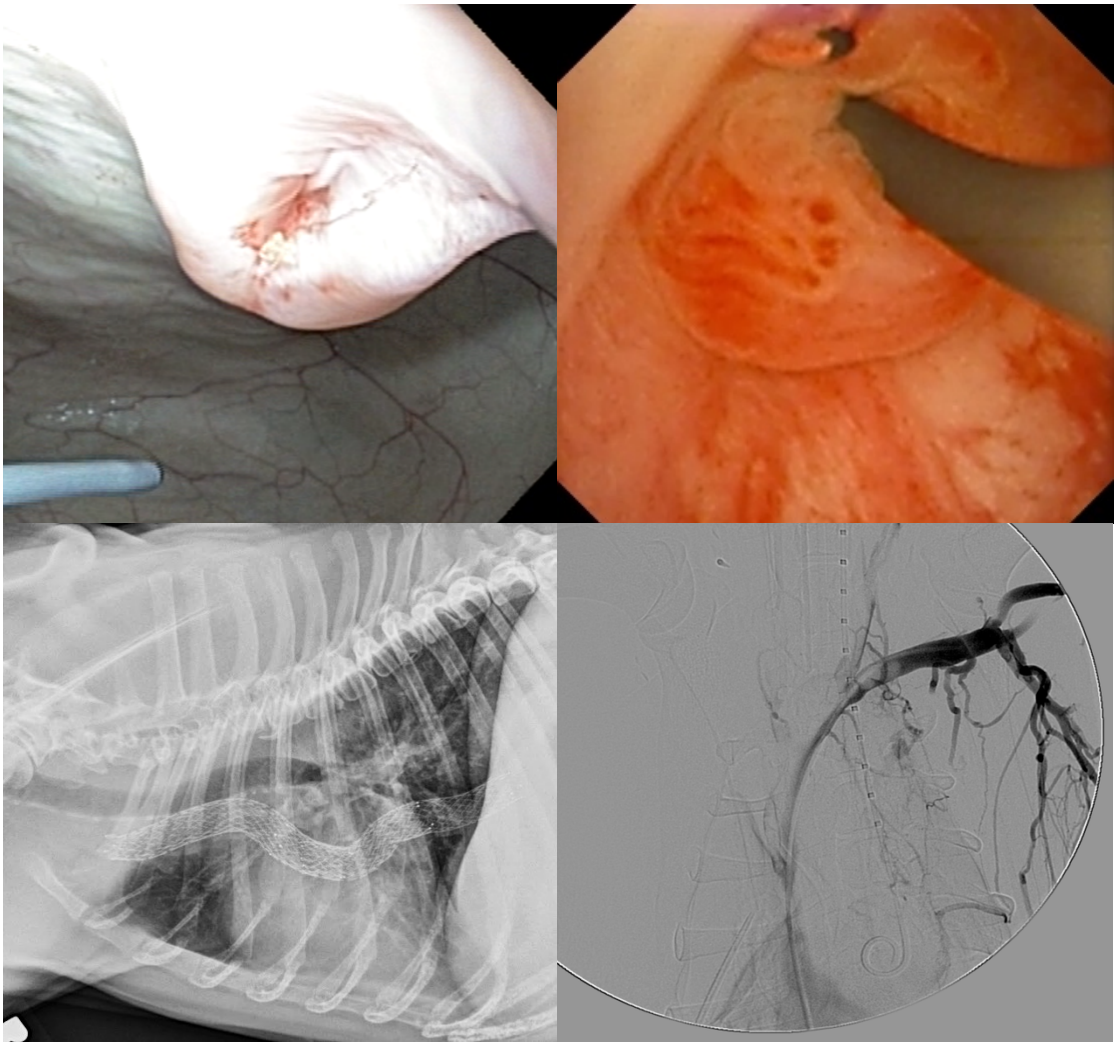
VETERINARY INTERVENTIONAL RADIOLOGY AND ENDOSCOPY SOCIETY SECOND ANNUAL MEETING

VIRIES



Cabo San Lucas, Mexico
Sheraton Grand Los Cabos Hacienda Del Mar
June 22-24th, 2017

2nd ANNUAL MEETING, Cabo San Lucas, Mexico,
June 22-24th, 2017

WELCOME TO OUR SECOND MEETING!

VIRIES MISSION: *Advancement of the art and science of veterinary interventional radiology and interventional endoscopy*

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Thursday June 22nd		Friday June 23rd		Saturday June24th	
14h00-14h30	**Welcome/Introduction**	**7h30-8h20**	**Scientific Abstract (7min with 5min discussion)** Dr Scansen– Measurement calibration in cardiac catheterization Dr Lapshin- Complicated PDA Dr Couto- Hemolysis following correction of an IHPSS **Discussion (10 min)**	**7h30-8h00**	**VIRIES Board meeting**
14h30-15h00	**Vendor Introduction**			**8h00-8h30**	**Scientific Abstracts (10min with 5min discussion)** Dr Dunn-Minimally invasive urinary access in tortoises, horse, pig Dr Zur Linden- Ultrasound-guided transurethral biopsy bladder masses
15h00-15h30	**Ablation Review** Dr Culp, Dr Steffey,Dr Case	**8h20-8h50**	**Review Clinical use of Xa inhibitors** Dr Scansen, Dr Dunn	**8h30-9h00**	**Scientific Abstracts (10min with 5min discussion)** Dr Dunn- Sonographic features of ureteral obstruction in cats Dr Burdick- Use of TPA for SUB obstruction
15h30-16h00 **16h00-16h15**	**Scientific Abstracts: (10min with 5min discussion)** Dr Culp- Thermal ablation canine urogenital neoplasia Dr Zur Linden- Microwave ablation in long bones **Ablation roundtable**	**8h50-9h30**	**Roundtable Management of thrombosis/thrombectomy**	**9h00-10h30**	**Review Biofilm Dr Ryder, Dr Kite** **Roundtable Managing complications in SUBs**
16h15-16h30	**Break (15 min)**	**9h30-9h45**	**Break (15 min)**		
16h30-16h45	**Scientific Abstract (10min with 5min discussion)** Dr Goode-Hepatic tumor perfusion using portal angiography	**9h45-10h15**	**Scientific Abstract (10min with 5min discussion)** Dr Scansen- Celiac trunk anomalies in dogs & cats Dr Weisse- Balloon dilation feeding tube for esophageal strictures		
16h45-17h30	**Review Clinical cases chembo-embolization** Dr Weisse, Dr Glaiberman	**10h15-11h30**	**Scientific Abstract (10min with 5min discussion)** Dr Culp- Temporary stent for NPS stenosis Dr Burdick- Review of outcome of treatment of NPS Dr Berent-Retrievable silicone stent for luminal obstructions	**10h30-10h45**	**Break (15 min)**
17h30-18h00	**Round Table Discussion** Chembo-embolization, tumor ablation			**10h45-11h15**	**Scientific Abstracts (10min with 5min discussion)** Dr Rogatko-Endoscopic ureterocele ablation Dr Berent-Novel collagen agent for treatment of USMI
18h00-19h30	**Cocktail/meet the vendors**	**11h30-12h00**	**Round Table Discussion** Managing nasopharyngeal disease	**11h15-11h45**	**Roundtable Managing incontinence**
				11h45-12h00	**Closing Remarks/ Meeting Round-up**

SOCIAL EVENTS

Wednesday June 21th 7h30 -10 pm – Gala Opening Dinner

Thursday June 22nd 6h00-7h30 pm – Cocktail Reception -meet the vendors, hors d'oeuvres and drinks.

SCIENTIFIC ABSTRACTS - Oral Presentations

USE OF THERMAL ABLATION TECHNIQUES IN THE TREATMENT OF CANINE UROGENITAL NEOPLASIA

Culp WTN[1], Johnson EG[1], Palm CA[2], Burton JH[1], Rebhun RB[1], Glaiberman CB[3] From the Departments of Surgical & Radiological Sciences[1] and Medicine & Epidemiology[2], University of California-Davis, School of Veterinary Medicine, Davis, CA; Department of Clinical Studies[3], Sutter Imaging, Interventional Radiology, Sacramento, CA

Objective: To describe the use and outcome of 2 thermal ablation techniques, microwave ablation (MA) and radiofrequency ablation (RFA), for the treatment of urogenital neoplasia in 2 dogs.

Study Design: Case series

Animals: 2 canine patients: renal carcinoma (n=1) and prostatic carcinoma (n=1).

Methods: Dogs (n=2) diagnosed with urogenital neoplasia that underwent thermal ablation with MA (renal carcinoma) and RFA (prostatic carcinoma), respectively, were included and medical records were reviewed.

Results: A solitary left renal nodule (1.1x1.2x1.4cm) was identified in 1 dog and cytologic evaluation determined it to be a carcinoma. Ultrasound-guidance was used to achieve percutaneous placement of an antenna used for MA into the renal nodule, and the lesion was successfully ablated. In the 2nd dog, a prostatic nodule (1x1x1.1cm) was identified on the right pole of the prostate and cytological evaluation showed it to be a carcinoma. As the dog was undergoing a planned celiotomy to remove metastatic lymph nodes (from a previously diagnosed anal sac adenocarcinoma), an RFA electrode was placed during surgery with the use of ultrasound-guidance; successful ablation was performed. No complications were encountered peri-operatively in either dog, and both dogs are alive with no signs of residual disease at 24- and 1-month post-MA and RFA, respectively.

Conclusions: MA and RFA were successfully performed in 2 dogs. No complications were encountered peri-operatively, and both dogs are alive with no signs of residual disease. Further evaluation of these techniques is necessary to determine long-term outcomes and the utility of these techniques in our veterinary patients.

PROTOCOL DEVELOPMENT FOR MICROWAVE ABLATION OF LONG BONES IN NORMAL DOGS AND PRELIMINARY RESULTS IN PATHOLOGICAL BONES WITH OSTEOSARCOMA.

Finck C[1], zur Linden A[1], Foster R[2], Singh A[1], Nykamp S[1], Sears W[3].

1. Department of Clinical Studies
2. Department of Pathobiology
3. Department of Population Medicine, Ontario Veterinary College, Guelph, Ontario, Canada.

Introduction: Thermal ablation is a technique used for palliative treatment of painful bone metastases and curative treatment of benign bone tumors in humans. The objectives of this study were 1) to describe a technique to perform microwave ablation (MWA) in canine long bones; 2) to develop a protocol for different ablation zone sizes; 3) to use this technique and protocol in canine neoplastic bones.

Methods: Ablations were performed in the metaphyses of 11 femurs and 11 tibias from normal cadaver dogs, and 3 bones with confirmed osteosarcoma (OSA) under CT guidance. The cortex was drilled perpendicular (normal bones) and oblique (osteosarcoma bones) to the long axis, a 14G trocar introduced, biopsies taken, a 15G microwave antenna placed, and ablations performed at three different settings (80W/30 sec, 80W/50 sec, 120W/50 sec) for normal bones, and 120W/50 sec for the OSA bones. The bones were sectioned and ablation zone sizes recorded.

Results: In the normal bones, a 3-way interaction was found between the type of bone, the location of ablation and the combination of settings ($p=0.05$), so it was not possible to compare ablation zone sizes to different settings. In the bones with OSA, some ablations were difficult to delineate due to pathological fractures however, ablation zone sizes were slightly larger than in normal bones.

Conclusions: A feasible MWA technique is described for canine long bones. It was not possible to compare ablation zone sizes to different settings. The technique was successfully applied to long bones with OSA.

EVALUATION OF HEPATIC TUMOR PORTAL PERFUSION USING MESENTERIC ANGIOGRAPHY: A PILOT STUDY IN 5 DOGS

Goode K, Weisse C, Berent A. From the Department of Interventional Radiology, The Animal Medical Center, New York, NY 10065

Objective: To evaluate hepatic tumor portal perfusion in dogs with incompletely resectable hepatic tumors using mesenteric angiography.

Design: Retrospective case series

Animals: Five dogs with incompletely resectable hepatic tumors evaluated with mesenteric portography.

Materials and methods: Electronic medical records at the Animal Medical Center were analyzed for dogs with primary or metastatic hepatic tumors evaluated using mesenteric portography. Once identified, the case records were reviewed and images obtained from mesenteric angiography were analyzed and compared to CAT scans and hepatic arteriography when available.

Results: Portography was accomplished using direct mesenteric venography in three dogs with HCC, cranial mesenteric arteriography in one dog with a hepatic adenoma or well-differentiated HCC, and via splenic AV fistula in one dog with diffuse hepatic hemangiosarcoma metastases. In each patient, mesenteric portography revealed diminished to absent portal blood flow to the hepatic tumors, with normal contrast uptake in the surrounding hepatic parenchyma. Arteriograms were performed in four of the cases and demonstrated evidence of a dominant arterial blood supply to these tumors.

Conclusions and clinical relevance: The findings from these cases reveal that in contrary to normal hepatic vasculature, the blood supply to large and metastatic hepatic tumors in dogs may strongly correlate with that in humans, such that the majority of the tumor blood supply stems from the hepatic artery, not from the portal vein. This relationship between the tumor and its blood supply is useful in developing targeted treatment for these tumors, especially when considering selective arterial therapies such as embolization or chemoembolization.

MEASUREMENT CALIBRATION IN THE CARDIAC CATHETERIZATION LABORATORY: A COMPARISON OF TWO METHODS

Scansen BA and Markovic LE
Colorado State University, Fort Collins, CO.

INTRODUCTION: Measurement accuracy is required for successful and safe transcatheter intervention. Different laboratories calibrate angiographic images by variable methods, though no studies in veterinary medicine have prospectively compared these techniques in a clinical cohort.

MATERIALS & METHODS: A single institution, prospective comparison of two reference calibration methods during cardiac catheterization was undertaken between May 2016 and March 2017. All angiograms were calibrated to both an esophageal marker catheter and then to a radiopaque ruler resting on the table. Relevant measurements were performed in triplicate and averaged. Comparisons between methods were made by correlation, paired t-test, and the method of Bland and Altman.

RESULTS: Twenty-five dogs undergoing transcatheter intervention were enrolled including balloon pulmonary valvuloplasty (n=14), ductal occlusion (8), cor triatriatum membranostomy (3), and balloon aortic valvuloplasty (1). Measurements calibrated to the esophageal catheter were greater than when calibrated to the table ruler ($P < 0.0001$). The mean bias was 0.8 mm having 95% limits of agreement from 0.1 mm to 1.7 mm, with greater bias for larger measurements. Patient weight was correlated to the difference between methods for valvuloplasty ($r = 0.9$, $P < 0.0001$), but not the other interventions.

CONCLUSIONS: Calibration of an angiographic image using a ruler placed on the fluoroscopy table during transcatheter procedures underestimates the actual size of a structure, when compared to a calibrated esophageal marker catheter placed at the same level as the heart. This effect is greatest in heavier patients and when measuring larger structures such as the pulmonary valve annulus.

COMPLICATED PDA TRANSVENOUS OCCLUSION IN DOG.

Lapshin A, [1]Innovative Veterinary Centre, Moscow, Russia, [2] Moscow State Academy of Veterinary Medicine and Bioscience, Moscow, Russia

An intact female Spitz dog, aged 8 months, weighing 2.4 kg with systolo-diastolic heart murmur on the left, identified at the physical examination was presented. At echocardiography, changes characteristic for patent ductus arteriosus(PDA). Transvenous PDA catheterization and angiography with 4F diagnostic catheter with a lumen of 0.038" were carried out, PDA amploule diameter was calculated as 4-5 mm, a detachable embolization coil with the diameter of 8 mm was introduced into the PDA lumen, but the coil fixation was unsuccessful. There was a change of the catheter to 6F Launcher with a lumen diameter of 0.071'' for positioning of the vascular occluder Amplazer Vascular plug II. A repeat angiography was carried out and PDA diameter was calculated as 6-7mm. Introduction of the vascular occluder with a diameter of 10 mm was performed with the help of the catheter. At the level of the catheter bending in the right ventricle, the occluder introduction is locked and further attempts were unsuccessful. During the manipulation, the dog developed bradycardia, requiring resuscitation. The decision was made to stop the operation. In a few days, re-operation was performed. After transvenous catheterization of the aorta, a delivery device Amplazer Torqvue 9F with the lumen diameter of 0.118'' was introduced into the PDA cavity through the guidewire, then using the delivery cable, vascular occluder with the diameter of 12 mm was introduced into the PDA ampoule and was successfully positioned. The systolo-diastolic murmurs immediately stopped. The animal was transferred to the intensive care unit. 24 hours after the surgery, at auscultation, the presence of more silent heart murmur was identified, echocardiography showed the presence of residual shunt. 4 hours after detection of the residual shunt, heart murmur disappeared again and simultaneously with this, the animal rapidly developed neurological symptoms characteristic of ischemic injury of the spinal cord in the TH3-L3 area with the development of spastic paralysis in the pelvic limbs. Within 3 weeks after the surgery, positive dynamics of the animal is noted and there appeared the opportunity of independent movement with preservation of the four-point gait. The observation continues.

INTRAVASCULAR HEMOLYSIS AFTER TRANSVENOUS COIL EMBOLIZATION OF AN INTRAHEPATIC PORTOSYSTEMIC SHUNT IN A DOG

Couto JI, Lux CN

University of Tennessee College of Veterinary Medicine, Department of Small Animal Clinical Sciences, Knoxville, TN.

Intravascular hemolysis is a rare complication associated with transvenous coil embolization procedures in both human and veterinary medicine. This report documents a case of peracute, self-limiting intravascular hemolysis after partial endovascular thrombogenic coil occlusion of a right divisional intrahepatic portosystemic shunt (IHPSS) in a 2-year-old female spayed Standard Poodle. A preoperative dual-phase contrast computed tomography scan confirmed the presence and location of the IHPSS. A standard approach to the percutaneous transvenous embolization procedure was performed with placement of a self-expanding Nitinol caudal vena cava stent and 19 thrombogenic coils (fifteen 8 mm and four 5mm coils). By the termination of the procedure, pigmenturia was present upon urination, and the packed cell volume (PCV) had decreased by 8%. Over the following 24 hours, the patient continued to have severe pigmenturia. Clinicopathologic analysis revealed the pigmenturia was secondary to the presence of hemoglobin from intravascular hemolysis. The PCV dropped an additional 4% postoperatively, and hemolyzed serum was noted during this time. The dog's BUN and creatinine values remained within normal limits. The urine color normalized grossly, and the PCV plateaued by 36 hours in the postoperative period. The dog developed mild neurologic abnormalities and aspiration pneumonia in addition to the intravascular hemolysis postoperatively. Despite these complications, the dog fully recovered and was discharged 4 days after surgery with Clavamox, lactulose, omeprazole, and levetiracetam. To the authors' knowledge, this is the first report of peracute intravascular hemolysis associated with coil embolization of an IHPSS in a dog.

CELIAC TRUNK ANOMALIES IN DOGS AND CATS ASSESSED BY COMPUTED TOMOGRAPHY ANGIOGRAPHY

Le Pommellet HM[1] and Scansen BA[1,2]
[1] The Ohio State University, Columbus, OH.
[2] Colorado State University, Fort Collins, CO.

Introduction: To identify anatomical variations of the celiac artery, cranial mesenteric artery, and their major branches in dogs and cats by computed tomographic angiography.

Materials & methods: A multi-institution, retrospective case review was undertaken. Abdominal CTA images from January 2009 to January 2017 were reviewed. Logistic regression was performed to evaluate the relationship between an arterial abnormality and sex, age, size of dog, concurrent venous anomaly, or presence of gastrointestinal signs.

Results: Computed tomography scans from 254 dogs and 13 cats were reviewed. Arterial abnormalities included 23 cases of celiac artery compression (9% of canine cases; no cats), six celiomesenteric trunks (2.6% of cases; 5 dogs, 2 cats), one case of splenic artery origination from the cranial mesenteric artery, and one case of hepatic arterial branches originating from the left gastric artery. Presence of an arterial anomaly was not associated with sex, age, or concurrent venous anomaly. Celiac artery compression was associated with gastrointestinal signs and was more prevalent in large breed dogs compared to small breed dogs.

Conclusions: Anomalies of the celiac trunk are apparent in dogs and cats and may impact image-guided intervention. Compression at the origin of the celiac artery was apparent on abdominal imaging of dogs, similar to celiac artery compression and the median arcuate ligament syndrome in people. The existence of a syndrome associated with celiac artery compression in dogs remains unknown, though large breed dogs appear to be at increased risk.

PROSPECTIVE EVALUATION OF AN INDWELLING ESOPHAGEAL BALLOON DILATION FEEDING TUBE FOR TREATMENT OF BENIGN ESOPHAGEAL STRICTURES IN 9 DOGS AND 3 CATS.

Tan DKS, Weisse C, Berent, AC. From the Department of Interventional Radiology, The Animal Medical Center, New York, NY.

Background: Despite multiple dilation procedures, benign esophageal strictures (BES) remain a recurring cause of morbidity and mortality in veterinary patients.

Objective: A pilot study to investigate a single procedure technique using an indwelling Esophageal Balloon Dilation Feeding Tube (EBDFT) for treatment of benign esophageal strictures (BES) in dogs and cats

Study Design: Prospective clinical trial

Animals: Nine dogs and three cats

Methods: Cases with confirmed BES were recruited for this prospective study. Endoscopic and fluoroscopic evaluation of the esophagus and balloon dilation was performed under general anesthesia, followed by placement of an indwelling EBDFT. The patients' owners performed twice daily, at-home inflations for approximately six weeks. Repeat endoscopy was performed prior to EBDFT removal. Cases were re-evaluated at regular intervals for changes in dysphagia scores post-EBDFT removal.

Results: The EBDFT management was easily performed by owners, well tolerated by both cats and dogs, and effective in maintaining dilation of a BES while in place. Cases were monitored for a mean of 520 days. The mean dysphagia score prior to treatment was 3.1/4.0, and at final patient follow-up was improved at 0.36/4.0. Eleven of 12 cases (91.7%) displayed improved dysphagia scores at the end of the follow up period, with 8/12 (66.7%) recording a dysphagia score of 0/4, 2/12 (16.7%) recording a dysphagia score of 1/4, and 1/12 (8.3%) recording a dysphagia score of 2/4.

Conclusion: EBDFT offers an effective alternative with fewer anesthetic episodes compared to repeated balloon dilation procedures for the treatment of BES in dogs and cats.

USE OF TEMPORARY STENT PLACEMENT IN THE MANAGEMENT OF BENIGN NASOPHARYNGEAL STENOSES IN DOGS

Culp WTN[1], Palm CA[2], Johnson LR[2]. From the Departments of Surgical & Radiological Sciences[1] and Medicine & Epidemiology[2], University of California-Davis, School of Veterinary Medicine, Davis, CA.

Objective: To describe the procedure and initial outcome of temporary stent placement in the management of benign nasopharyngeal stenosis (NPS).

Study Design: Case series

Animals: 6 client-owned dogs

Methods: Medical records of 6 dogs diagnosed with benign NPS that underwent temporary stenting were reviewed. Access through the nasopharynx was achieved with fluoroscopic- and/or endoscopic-guidance. After dilation, latex stents were placed over a guide wire and sutured in position. Stents were removed and outcomes recorded.

Results: Six dogs with NPS were included. Median weight was 12.5 kg (range, 5.2-27.6 kg). Suspected causes of NPS were rhinitis post-anesthesia (n=3), trauma secondary to motor vehicular accident (1), and foreign body reaction (1); a 6th case was treated after nasal tumor resection prior to radiation therapy. Technical success was 100%, with bilateral stents successfully placed in all dogs. Length of time that stents were in place was between 5-8 weeks. Complications associated with temporary stent placement included premature removal in 2 dogs and oronasal fistula in 1 dog (that also underwent ventral rhinotomy). In the 5 dogs with long-term follow-up (1 dog currently has stents in place), nasal airflow was re-established or maintained bilaterally or unilaterally in 4 and 1 dog, respectively. All dogs demonstrated improvement in clinical signs.

Conclusions: This technique provided a minimally-invasive, image-guided treatment of benign NPS with high technical success. While early in the implementation of this technique, initial clinical responses have been promising. This treatment modality shows promise as a non-permanent treatment for NPS.

EVALUATION OF SHORT AND LONG TERM OUTCOMES USING VARIOUS INTERVENTIONAL TREATMENT OPTIONS FOR NASOPHARYNGEAL STENOSIS IN DOGS AND CATS.

S Burdick[1], A Berent[2], C Weisse[2], D Palma[2], L Asprea[2]. [1]From Red Bank Veterinary Hospital, Tinton Falls NJ, [2]From The Animal Medical Center, New York, NY

The purpose of this report is to evaluate the short- and long-term outcomes in dogs and cats after balloon dilation (BD), placement of a non-covered MS (MS), and/or a covered-MS (CMS), for the treatment of Nasopharyngeal Stenosis (NPS).

Medical records of patients that underwent treatment of NPS in the authors' practice with BD, MS or CMS were retrospectively reviewed. Data on signalment, history, clinical signs, NPS location, degree of attenuation, treatment approach, and short- and long-term outcomes were recorded.

27 patients had BD initially attempted. BD was unsuccessful due to tissue ingrowth in 59% patients (50% cats, 100% dogs). Stents were placed in 34 patients. Thirty had a MS placed and 11 a CMS (+/-MS). Four cats had 2 MS and one dog had two CMS placed. For the 34 patients with stents, there was a 68% complication rate, which included chronic infections (41%; 23% MS,73%CMS) tissue in-growth (29%;33%MS,0%CMS), oronasal fistula (21%;13%MS,27%CMS), stent fracture (15%;17%MS,0%CMS), stent migration (9%;7%MS, 9%CMS), exaggerated swallowing (9%;10%MS, 0%CMS), bending of the stent (9%; 7%MS, 0%CMS), and stent removal (18%; 13%MS, 18%CMS). The ultimate long-term outcome was considered successful by owners in 78% of all patients (median 24 months; range, 2-109 months).

NPS can be successfully treated in a minimally invasive manner with BD, MS and CMS. Failure with BD alone is common, especially in dogs. Chances of ultimate success are significantly increased with the use of stents, however there is a high complication rate that must be considered.

SHORT TERM USE OF A NOVEL RETRIEVABLE SILICONE COVERED SELF EXPANDING METALLIC STENT (R-CMS) IN VETERINARY PATIENTS FOR TREATMENT OF LUMINAL OBSTRUCTIONS: A PILOT STUDY

Berent A[1], Weisse C[1].
The Animal Medical Center, NY, NY

The objective of this study was evaluate the safety and efficacy of a novel, retrievable, silicone covered/embedded, single wire nitinol self-expanding metallic stent (R-CMS) used for various causes of luminal stenosis.

The stent was placed using fluoroscopic and endoscopic guidance in a minimally invasive manner in all patients. Standard technique for sizing was applied using a measuring-catheter and Computed Tomography, when indicated.

Medical records and fluoroscopic/endoscopic images were reviewed for pre-, intra-, and post-operative data.

Seven dogs and 2 cats had 15 stents placed. Five animals (8 stents) had stents placed for nasopharyngeal stenosis (NPS; 1 imperforate and 4 patent), 2 (4 stents) for urethral strictures associated with proliferative urethritis, and 2 (3 stents) for obstructive transitional cell carcinoma that either failed uncovered SEMS (n=1) or wanted an option for a retrievable stent if incontinence ensued (n=1). Placement was successful in all cases. Resolution of obstruction was achieved in 100% of patients. All NPS stents had a suture used to secure the stent in place through the palate (T-fastener[3] or suture[3]). No tacking suture was needed for the urethral stents. No stent migrated. No evidence of stent-associated complications were identified in the short follow-up period (median 65 days; range: 2-95 days).

The R-CMS was used with short-term success in the patients of this pilot study for various causes of urethral and nasopharyngeal luminal obstructions. The stent was able to be retrieved when needed without incident. This stent is being further evaluated for its use for long-term patency and complications.

MINIMALLY INVASIVE URINARY TRACT ACCESS IN TORTOISES, A POT-BELLIED PIG AND A MARE

Dunn M, Gosset C, Montasell X, Leclère M, Langlois I.
From the Department of Clinical Sciences, University of Montreal Veterinary Teaching Hospital, Saint-Hyacinthe, J2S 8H5, Canada.

Case Description – Accessing the urinary tract in various species can be challenging. This case series describes access to the urinary tract in 4 clinical cases.

Clinical Findings- Treatment and Outcome

Case #1 Sulcata tortoise was presented for dysuria and diagnosed with a bladder stone. Under anesthesia, a14Fr 30^{o}angled cystoscope was used to access the cloaca, identify the urethral papilla, and perform cystoscopy followed by laser lithotripsy. Compartementalization of the bladder posed certain challenges.

Case #2 Sulcata tortoise was presented for constipation and was diagnosed with a cloacal stone. Under anesthesia the cloaca was accessed with a 14Fr 30^{o} cystoscope and the stone was rapidly fragmented by electrohydraulic lithotripsy.

Case #3 Teacup pot-bellied pig (5kg) was presented for acute onset of dysuria. An obstructive urethral stone (distal to the urethral recess and proximal to the sigmoid flexure) was diagnosed by ultrasonography. Through a PCCL approach, the urethra was accessed with a flexible 2.7mm ureteroscope over a gidewire. The urethral stone was fragmented with basket forceps. An antegrade cystourethrogram revealed relief of the obstruction.

Case #4 5 yr old Arabian mare was presented for unilateral ureteral obstruction by a 2.5 cm stone in the proximal 1/3 of the ureter (45cm from the vulva) identified on ultrasound. Access to the ureter was achieved under sedation with a guidewire and 7mm x 1M gastroscope. Ureteroscopy and subsequent laser lithotripsy successfully fragmented the stone and relieved the obstruction.

Clinical Relevance – Minimally invasive access to the urinary tract can be achieved in various species despite anatomic challenges.

NOVEL TECHNIQUE: ULTRASOUND GUIDED TRANSURETHRAL ENDOSCOPIC BIOPSY OF URINARY BLADDER LESIONS, INITIAL USE IN TWO CANINE PATIENTS

Zur Linden A[1], Walker M[1], Phillips J[2].

1. Department of Clinical studies, Ontario Veterinary College
2. College of Arts, University of Guelph, Ontario, Canada.

Introduction: Biopsies of the urinary bladder are critical to diagnose and monitor the progression of various conditions including neoplasia and cystitis. Current methods are expensive, require general anesthesia, can be inhibited by hemorrhage, or risk tumor seeding. A novel technique to biopsy the urinary bladder using ultrasound guidance was developed with the use of a canine bladder model.

MaterialS and methods: The urinary bladder is catheterized with a urinary catheter with the tip cut off to allow passage of a guidewire. The bladder catheter is exchanged with a steerable vascular catheter. Standard endoscopic biopsy forceps are passed into the steerable catheter near the tip. Using ultrasound guidance, the steerable catheter is directed towards the bladder lesion and multiple biopsy forceps obtained without removing the catheter.

Results: Two patients had this procedure performed with client consent. The first was a 10 year old, female spayed, Cocker Spaniel (17kg). The second was a 12 year old, female spayed, West Highland White Terrier (11kg). Histopathology results of the first patient revealed chronic lymphoplasmacytic and neutrophilic cystitis, and urothelial proliferation for the second patient.

Conclusions: A novel technique to obtain biopsies of the urinary bladder was successfully performed in two canine patients. Further investigation and comparison to cystoscopy or surgical biopsies are needed to determine the diagnostic utility of this technique and cost effectiveness.

SONOGRAPHIC FEATURES OF URETERAL OBSTRUCTION IN CATS

Anne-Archard N., Dunn M., d'Anjou M.A. – From the Department of Clinical Sciences, University of Montreal Veterinary Teaching Hospital, Saint-Hyacinthe, J2S 8H5, Canada.

Introduction: While ultrasound is commonly used for identifying ureteral obstruction in cats, the overlap of sonographic findings with those of non-obstructive disease makes the diagnosis challenging. The goal of this retrospective study was to better characterize the sonographic features of feline ureteral obstruction.

Methods: Medical records from the CHUV were searched for cats that had a confirmed diagnosis of ureteral obstruction followed by SUB placement. Obstructions were confirmed based on intraoperative antegrade pyelogram. Pre-operative ultrasound images and reports were reviewed.

Results: 45 confirmed ureteral obstructions were recorded in 37 cats (2012-2016). The median age was 8.5 years (range 2.5-17). Median pelvis height obtained in a transverse image was 6.9mm (range 0-37). The pelvis measured (≤4mm) in 24% of kidneys and < 2mm in 2 of them. The median intraluminal ureteral diameter was 3.2mm (range 0-11) and 27% of ureters measured < 2mm. Renal diverticulae were dilated in 80% of kidneys. Renal mineralization was present in 85% of kidneys, but obstructive stones were identified with in 64% of ureters. Sixteen (47%) kidneys showed sonographic signs of concurrent chronic renal disease. Hyperechoic fat was observed around 36% of kidneys and retroperitoneal effusion was detected in 14% of cats.

Discussion/Conclusion:
While most cats had significant pelvic and ureteral dilation, 24% of affected kidneys showed mild pelvic dilation (<4mm) and 26% of ureters measured less than 2mm. Multivariate analysis and comparing this population with cats without obstruction may help identify signs or combination of signs to better predict the presence of ureteral obstruction with ultrasound.

THE USE OF LOCALIZED TISSUE PLASMINOGEN ACTIVATOR TO ALLEVIATE POST OPERATIVE SUBCUTANEOUS URETERAL BYPASS OBSTRUCTION SECONDARY TO BLOOD CLOT IN THREE CATS

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Case description: Three cats between 4 and 11 years of age were evaluated for treatment of unilateral (2) or bilateral (1) ureteral obstruction. Patients were evaluated on an elective basis after routine labwork revealed azotemia (1), or on an emergent (2) basis for lethargy (1), anorexia (2), vomiting (1), and a painful abdomen (1). All 3 cats underwent abdominal ultrasonography.

Treatment and outcome: All cats underwent ventral midline laparotomy and antegrade ureteral pyelogram to confirm ureteral obstruction. Immediate placement of the subcutaneous ureteral bypass (SUB) was performed unilaterally (2) or bilaterally (1). In all cats, obstruction of the SUB device secondary to blood clot formation in the cystostomy tube (2) or the nephrostomy and cystostomy tube (1) was confirmed ultrasonographically and via SUB flush 1, 3 and 5 days postoperatively. Tissue plasminogen activator (tPA) was simultaneously infused into the SUB port and a urethral catheter in all cats. The clot was dissolved and subsequent drainage of urine through the SUB device was achieved in all cats.

Clinical relevance: Post-operative obstruction of the SUB device with blood clot is a rare, but frustrating complication that often requires surgical correction. Results of the present small case series suggest that tPA may be utilized in a minimally invasive manner for dissolution of blood clots post SUB device placement avoiding the need for catheter exchange in some cases.

ENDOSCOPIC LASER-ABLATION OF THE URETERAL ORIFICE FOR THE TREATMENT OF ORTHOTOPIC AND ECTOPIC URETEROCELES IN DOGS: 8 CASES (2013-2016)

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Objective: To describe the technique and clinical outcome of cystoscopic-guided laser ablation (CLA) of the ureteral outflow tract for the treatment of ureteroceles in dogs.

Study design: Retrospective series

Animals: 8 dogs (8 ureteroceles)

Methods: Medical records of dogs that underwent cystourethroscopyscopy for treatment of a ureterocele were reviewed. Each ureterocele was identified ultrasonographically and cystoscopically. Retrograde ureteropyelography was performed using endoscopic and fluoroscopic-guidance. Diode laser extension of the stenotic ureteral orifice (UO) was performed, unless surgical conversion was necessary. Information on pre and post-procedural biochemical, imaging, and clinical outcome parameters were obtained.

Results: Eight dogs (4 males, 4 females) had CLA to correct the UO stenosis associated with the ureterocele (5 right, 3 left-sided). Median age and weight were 2 years and 21 kilograms. Median procedure time was 84 minutes. Treatment was accomplished via retrograde (4 females), percutaneous antegrade (1 male), or perineal access for retrograde cystourethroscopy (1 male). Surgical conversion was needed in 2 males. No post-operative complications were noted. All had UO stenosis resulting in the ureterocele. 6 were bilaterally ectopic. One previously had ectopic ureteral reimplantation and the ligated tunnel resulted in a ureterocele. 2 were orthoptic. Incontinence, UTIs, and azotemia was present in 6/8, 5/8, and 2/8 pre-operatively, and 0/8 at time of last follow-up, respectively. 7/8 were associated with hydroureter and/or hydronephrosis, and 3/5 improved post-operatively. Median follow-up time was 18 months (3-43).

Conclusions: CLA was safe and effective for treating UO stenosis associated ureteroceles in dogs. Ureteroceles can be associate
ed with orthotopic or ectopic ureteral stenosis.

THE USE OF A NOVEL TRANSURETHRAL COLLAGEN AGENT FOR SUBMUCOSAL INJECTION IN FEMALE DOGS WITH USMI: A SAFETY PILOT STUDY IN DOGS

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Objective: To evaluate the safety of a novel transurethral bulking agent for the treatment of USMI in female dogs.

Study Design: Prospective safety pilot study
Animals: 4 FS dogs.

Methods: Cystourethroscopy was performed in all dogs to assess all urogenital abnormalities. All dogs had a negative urine culture prior to cystourethroscopy. Using a 22 gauge injection needle through a 30 degree rigid cystoscope a novel sterile bovine collagen agent was injected into the submucosal tissue approximately 1 and 2 cm caudal to the urethrovesicular junction creating coaptation of the urethral lumen. Continence scores were recorded before and serially after the procedure. All dogs were re-scoped 6 weeks after injections to asses the urethral lumen for any gross complications or material absorption. For patients that were anatomically normal, they were then subsequently enrolled in the Phase II long-term efficacy study.

Results: Dogs ranged in age from 1.5-12.5 years. All dogs were treated medically (phenylpropanolamine 4/4, estrogen 3/4) prior to collagen injections. One dog had a history of surgically corrected ectopic ureters and another had a successful collagen injection 4.5 years prior that lasted for 4 years. 2 dogs had chronic UTIs. One dog had a PPMR that was laser ablated 5 months prior, and another had one at the time of collagen injections. Two dogs had a urachal diverticulum, 1 had a short urethral length (2.5 cm). There were no complications during the injections. At the 6 week recheck all urethral blebs were visible but less robust grossly. All dogs had coaptation of the urethral lumen at the site of the blebs at 6 weeks when infusion was not applied. The median pre-continence score was 5.5/10 (range, 2.5-8) and the 1, 2, 6 week post-injection scores were 10 (all 10), 10 (9.5 to 10), and 10 (9.5 to 10), respectively. One dog had a urinary tract infection documented 2 weeks after injections and was cleared with 2 weeks of antibiotics.

Conclusions: This novel collagen agent was easy to inject and safe to use in this small number of dogs. The material remained present in the submucosal tissue at 6 weeks post injection based on urethroscopy visualization and there was no gross or clinical reaction to the treatment in any dog. Short-term efficacy was excellent in all dogs. Phase II will evaluate long-term efficacy of these injections in female dogs with USMI.