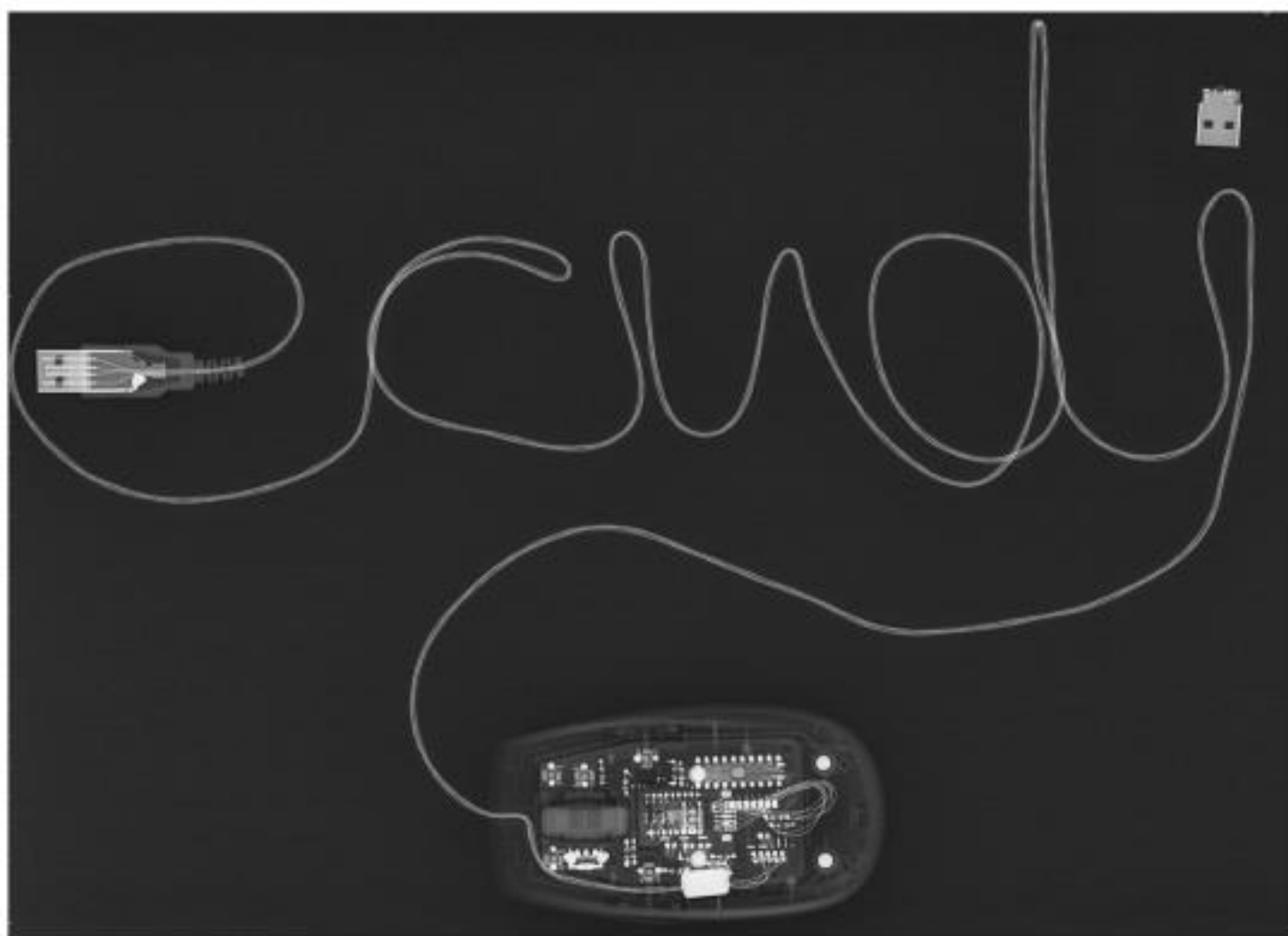




Online Conference 2020

ECVDI® European College of
Veterinary Diagnostic Imaging®

17/18th September 2020



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PROGRAMME 17 SEPTEMBER 2020

All times are in: **BST** (British Summer Time)

14.00-14.15: Introduction

14.15-14.30: Radiographic and computed tomographic findings in three dogs with pulmonary interstitial emphysema unrelated to general anaesthesia | *M. Frau*

14.30-14.45: Computed tomographic appearance of sialoceles in dogs | *S. Oetelaar*

14.45-15.00: CT may be helpful in discriminating grass awn-associated rhinitis from non-foreign body rhinitis in dogs | *F. Lafuma*

15.00-15.15: A simplified and accurate CT-volumetry method for the canine liver | *N. Israeliantz*

15.15-15.30: Comparison of computed tomographic features of 79 cats with intranasal mass lesions | *S. Bouyssou*

15.30-15.45: Machine learning for triage and prioritised reporting of dorsoventral canine thoracic radiographs | *W.J.E. Humphreys*

15.45-16.00: Break

16.00-16.15: Ultrasonographic appearance of confirmed cholecystitis in dogs | *R. Constantinescu*

16.15-16.30: Prevalence of ultrasonographic gallbladder wall thickening in dogs with hypoalbuminaemia | *M. Murakami*

16.30-16.45: Ultrasonographic evaluation of adrenal gland thickness in healthy cats | *L. Pérez-López*

16.45-17.00: Correlation between renal Doppler sonography in dogs with chronic kidney disease | *R. Constantinescu*

17.00-17.45: Small Animal Keynote Lecture: An Update on Esophageal Imaging | *Rachel Pollard*

PROGRAMME 18 SEPTEMBER 2020

All times are in: **BST** (British Summer Time)

09.00-09.30: Large Animal Keynote Lecture: Computed tomography and CT myelography of the equine neck | *Jonathon Dixon*

09.30-09.45: Comparison of three MRI quantitative sequences and two drawing approaches for assessment of lumbar degenerative disc degeneration in an ovine model | *N. Bouhsina*

09.45-10.00: Radiographic features of equine vertebral neoplasia | *G. Manso-Díaz*

10.00-10.15: Inter- and intra-observer agreement and reliability of grading thoracolumbar spinous processes in horses without back pain on pre-purchase radiographs | *M.G.P. Looijen*

10.15-10.30: Digital Tomosynthesis: Technical set-up and clinical application in the equine head | *G. Manso-Díaz*

10.30-11:00: Break

11.00-11.15: Positive contrast magnetic resonance and computed tomography bursography for evaluation of navicular bursae adhesions: preliminary study | *C. Spediacci*

11.15-11.30: Effect of forelimb conformation and foot imbalance on the collateral ligaments of the equine distal interphalangeal joint | *A.E. Giavitto*

11.30-11.45: Computed tomographic and histopathological characteristics of 13 equine and 10 feline oral and sinonasal squamous cell carcinomas | *C. Strohmayer*

11.45-12.00: Evaluation of shear wave elastography to assess canine lens stiffness in aging subjects and in case of cataract | *F. Del Signore*

12.00-12.45: Lunch

12.45-13.30: Small Animal Keynote Lecture: How to Optimize Urological CT Studies | *Tobias Schwarz*

13.30-13.45: Accuracy of low-field MRI for differentiation intervertebral disc extrusions (IVDE) and protrusions (IVDP) at the lumbosacral disc space in dogs | *H. Shing*

13.45-14.00: Canine oligodendroglioma grading based on magnetic resonance imaging features | *B. Amphimaque*

14.00-14.15: Lymphoscintigraphy for sentinel lymph node detection: a modern approach for preoperative staging of canine malignant tumors | *M. Manfredi*

14.15-14.45: Break

14.45-16.00: Film reading session | *Ilva Drumm & Yseult Baeumlin*

The film reading session is kindly sponsored by: **IDEXX Telemetric Consultants**

KEYNOTE SPEAKERS

Meet our Keynote speakers for the 2020 ECVDI online congress:



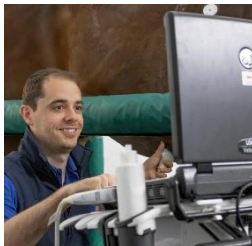
Rachel Pollard

DVM, PhD, DipACVR
School of Veterinary Medicine, University of California, Davis

Dr. Rachel Pollard attended Washington State University for her DVM. She then moved to New York for a one-year internship at the Animal Medical Center. Dr. Pollard then completed a four-year residency in diagnostic imaging and a PhD in Comparative Pathology at the University of California, Davis. Dr. Pollard joined the highly esteemed diagnostic imaging faculty at UC Davis in 2005 and is currently a Professor of Radiology and Vice-Chair for the Department of Surgical and Radiological Sciences. She has received several teaching awards during her career and is in high demand as a speaker at international continuing education events. She enjoys skiing, backpacking and spending time with her family.

Lecture:

Thursday 17 September | 17.00-17.45: An Update on Esophageal Imaging



Jonathon Dixon

BVetMed, MVetMed, DipECVDI, MRCVS
Rainbow Equine Hospital

Jonathon qualified from the Royal Veterinary College and initially joined Rainbow Equine Hospital as an intern for 18 months where he developed an interest in advanced imaging, in particular CT and MRI. He then undertook a 3-year senior clinical training scholarship (residency) at the Royal Veterinary College in Large Animal Diagnostic Imaging before returning to Rainbow. In 2017 he became a European Specialist in Veterinary Diagnostic Imaging, and subsequently in 2018 an RCVS Specialist in Large Animal Diagnostic Imaging. Jonathon oversees the imaging caseload and assists with radiography and ultrasonography to ensure that all horses coming to the hospital benefit from state-of-the-art diagnostics. He has particular interests in CT imaging of the head and neck, and MRI of the distal limb.

Lecture:

Friday 18 September | 09.00-09.30: Computed tomography and CT myelography of the equine neck



Tobias Schwarz

MA Dr. med. vet. DipECVDI DACVR DVR FRCVS
Royal (Dick) School of Veterinary Studies, University of Edinburgh

Tobias Schwarz grew up in East Germany and studied veterinary medicine and Scandinavian literature and linguistics at the Humboldt University of Berlin. He developed a passion for macroscopic anatomy and macroscopic imaging and did his doctoral thesis on nasal radiography and CT. He did a diagnostic imaging residency at Glasgow University Veterinary School in Scotland and became a Diplomate in Diagnostic Imaging with the British Royal College of Veterinary Surgeons (DVR), the European College of Veterinary Diagnostic Imaging (DipECVDI) and the American College of Veterinary Surgery (DACVR). He has worked as an academic radiologist at the Universities of Pennsylvania and Wisconsin-Madison in the United States for 10 years and since 2009 is the head of the Diagnostic Imaging Service at the Royal (Dick) School of Veterinary Studies in Edinburgh, Scotland. In 2017, he was elected as a Fellow of the British Royal College of Veterinary Surgeons (FRCVS). He has published over 100 peer-reviewed scientific articles and his particular interests are thoracic imaging and computed tomography. On both topics he has published a comprehensive textbook.

Lecture:

Friday 18 September | 12.45-13.30: How to Optimize Urological CT Studies



Ilva Drumm

Dr.Med.et, DipACVR, MS, FTA
IDEXX Telemedicine

Ilva Drumm attended vet school in Munich, then undertook her specialist training in the United States, first an internship at Rood and Riddle Equine Hospital, Lexington, KY, followed by a residency in diagnostic imaging and Master of Science at the Ohio State University. Since obtaining her DipACVR she has spent time in private practice both in Germany and the UK and since 2016 has been a teleradiologist for IDEXX Telemedicine.

Lecture:

Friday 18 September | 14.45-16.00: Film reading session | Ilva Drumm & Yseult Baeumlin

ABSTRACTS 17 SEPTEMBER 2020

Oral abstracts Thursday

RADIOGRAPHIC AND COMPUTED TOMOGRAPHIC FINDINGS IN THREE DOGS WITH PULMONARY INTERSTITIAL EMPHYSEMA UNRELATED TO GENERAL ANAESTHESIA

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²Medicina I Cirurgia Animal, Universitat Autònoma de Barcelona, Barcelona, Spain

³Pathology, University of Nottingham, Derby, United Kingdom

Introduction / Purpose:

Pulmonary interstitial emphysema (PIE) is the abnormal presence of air in the pulmonary interstitium and is associated with the Macklin effect. This occurs secondary to alveolar rupture, where interstitial air tracks along the bronchi and pulmonary vessels resulting in a pneumomediastinum. PIE has been reported in dogs, the most common cause being barotrauma associated with hyperventilation during general anaesthesia. The aim of this study was to report the radiographic and computed tomographic (CT) findings in dogs with PIE unrelated to general anaesthesia.

Methods:

The clinical records of two referral hospitals were searched for patients with histopathologically confirmed PIE that had thoracic radiographs and/or a thoracic CT study performed during hospitalization. Patients were excluded if general anaesthesia was induced during image acquisition. Studies were analysed by a board certified radiologist (CA) and the following features recorded: perivascular/peribronchial air, pneumomediastinum, pneumoretroperitoneum, pneumothorax and tracheal rupture.

Results:

Three dogs met the inclusion criteria, a cross breed, a Labrador and a Boxer, ages ranged from one to eight years. Final diagnoses included pulmonary fibrosis, small intestinal lymphoma and a spinal oligodendroglioma. Thoracic radiographs were available for two dogs. Perivascular/peribronchial air was identified in two dogs and pneumomediastinum in one. Thoracic CT was available for all three dogs. Perivascular/peribronchial air was identified in all dogs and pneumomediastinum in two dogs. Pneumoretroperitoneum, pneumothorax and tracheal rupture were not identified in any dog.

Discussion / Conclusion:

Identified changes related to the Macklin effect in all three non-anaesthetised dogs with histopathologically confirmed PIE.

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COMPUTED TOMOGRAPHIC APPEARANCE OF SIALOCELES IN DOGS

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²Veterinary Clinical Sciences, Purdue University College of Veterinary Medicine, West Lafayette, United States of America

Introduction / Purpose:

The computed tomographic (CT) appearance of sialoceles is limited to brief descriptions from reported cases in 6 dogs and 1 cat. The authors have seen sialoceles with CT characteristics that differ from these previous reports. The purpose of this study was to provide more detailed descriptions of the CT appearance of confirmed sialoceles in dogs.

Methods:

This was a retrospective descriptive study of dogs over a 10-year period with cytologically or histologically confirmed sialoceles and pre- and post-contrast CT studies of the head. Multiple qualitative and quantitative features were described for each sialocele with histological correlation where applicable.

Results:

Seven dogs with a total of eight sialoceles were identified: five cervical sialoceles, two combined cervical and sublingual sialoceles, and one sublingual sialocele. All sialoceles were characterized by fluid attenuating, non-contrast enhancing contents (median = 19 HU) and soft tissue attenuating, contrast-enhancing capsules. External capsular margins of all sialoceles were smooth; however, internal capsular margins in five sialoceles were irregular with poorly defined nodular to frond-like protrusions. Mineralized foci of variable size (range = <1 mm to 4.8 mm) and attenuation (range = 119 to 1253 HU) were present in seven sialoceles. Histology of these mineralized foci were consistent with sialoliths (three sialoceles) and osseous metaplasia (two sialoceles).

Discussion / Conclusion:

A common finding in the sialoceles in this study was the presence of intraluminal nodular to frond-like protrusions arising from the capsule wall. This is the first study to report the CT appearance of cervical sialoceles and sialocele mineralizations (sialoliths and osseous metaplasia).

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CT MAY BE HELPFUL IN DISCRIMINATING GRASS AWN-ASSOCIATED RHINITIS FROM NON-FOREIGN BODY RHINITIS IN THE DOG

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²Internal Medicine, Centre Hospitalier Vétérinaire Languedocia, Montpellier, France

Introduction / Purpose:

This retrospective case study aimed to search for discriminating CT findings between dogs with grass awn-associated rhinitis and dogs with non-foreign body rhinitis.

Methods:

47 dogs with a CT evaluation of the head and a confirmed diagnosis of non-foreign body rhinitis (25 cases) or of a nasal grass awn foreign body (22 cases) were included. For each group, patient data and CT scans were reviewed and compared for statistical significance.

Results:

Only 1/22 (5%) grass seeds was visualized directly on CT images. Unilateral turbinates lysis and focal turbinates lysis were associated with the presence of a foreign body with respective likelihood ratios of 1.4 and 3.0. When focal, lysis was preferentially ventrally located in both groups. Bilateral lysis was not associated with either diagnosis ($p=0.051$) although it was more frequent in the non-foreign body rhinitis group. Maxillary recess filling was associated with non-foreign body rhinitis (LR=4.4) as was widespread lysis (LR=2.0). Clinical characteristics, paranasal bone lysis and presence, side and amount of secretions were not associated with either diagnosis.

Discussion / Conclusion:

Few nasal grass seed fragments are visible on CT images. A unilateral, focal turbinates lysis without sinus involvement is in favour of a nasal grass awn foreign body while widespread lysis and maxillary recess filling are associated with non-foreign body rhinitis.

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A SIMPLIFIED AND ACCURATE CT-VOLUMETRY METHOD FOR THE CANINE LIVER

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Introduction / Purpose:

CT liver volumetry using the slice addition technique is an accurate, but time-consuming method. Certain viewing software only allows contouring of one area per image, and this can be troublesome in transverse reconstruction of the canine liver as the different lobes are separated. We aimed to determine if hepatic contouring using a sagittal reconstruction and in a reduced number of images would yield accurate results.

Methods:

CT studies were performed in five canine cadavers and reviewed using a sagittal reconstruction. For each dog, the number of images that included the liver was determined and used to create four lists with progressively more images in which the liver would be contoured, each with the following median number of images: A: 9 (range 9-9), B: 16 (range 16-17), C: 31 (range 30-33), and D: 60 (range 58-65). Liver volume was estimated by three observers using the different lists. Livers were dissected, and their volumes determined by water displacement. Single score intraclass correlation coefficient was calculated to assess agreement between observers. Kruskal-Wallis test was used to compare the differences between the water displacement and CT-based volumes.

Results:

There was excellent agreement between observers (ICC = 0.957; 95% CI = 0.908-0.982, $p < 0.0001$). No significant differences were found between the volumes obtained by CT-volumetry using each of the lists and the volumes obtained by water displacement.

Discussion / Conclusion:

Using a sagittal reconstruction and hepatic contouring in as few as nine images can be an accurate and simple method for CT-volumetry of the canine liver.

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COMPARISON OF COMPUTED TOMOGRAPHIC FEATURES OF 79 CATS WITH INTRANASAL MASS LESIONS

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Introduction / Purpose:

Comparing the CT characteristics of cats diagnosed with an intranasal mass lesion to assess if defining features exist between different tumors types and between neoplastic and non-neoplastic lesions.

Methods:

Medical records of two different institutions were reviewed for cats that showed CT findings consistent with intranasal mass lesion and that had subsequent histopathological examination. For each CT scan the mass location, laterality, growth pattern, margin distinction, contrast enhancement pattern and the presence of intralesional areas of mineralization or necrosis were recorded. The presence of facial deformity, the location and type of bone changes, the extension of the mass lesion to extranasal locations and the regional lymph nodes size, contrast pattern and hilus visibility were also assessed.

Results:

Seventy-nine cats met the inclusion criteria. Cats with non-lymphomatous nasal neoplasia were more likely to show unilateral nasal changes ($P=0.02$), areas of intralesional calcification ($P=0.014$) and extension of the mass lesion within the frontal sinus ($P=0.03$) while cats suffering from nasal lymphoma were more likely to show a mixed ($P=0.006$) and expansile growth pattern ($P=0.003$) and regional lymphadenomegaly ($P=0.018$). The CT findings in cats diagnosed with inflammatory mass-like lesions were highly variable and overlapped with those found with nasal neoplasia but were significantly associated with the absence of bony changes to the nasal cavity boundaries ($P=0.013$).

Discussion / Conclusion:

Findings from the current study support the ability of CT findings to aid in the discrimination of tumor type in cats presented with an intranasal mass lesion.

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MACHINE LEARNING FOR TRIAGE AND PRIORITISED REPORTING OF DORSOVENTRAL CANINE THORACIC RADIOGRAPHS

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Introduction / Purpose:

Machine learning has seen a tremendous rise in application and research interest during the previous decade. Multi-layer convolutional neural networks are of particular interest in image processing and classification tasks and have achieved state of the art in medical radiology tasks. The aim of this study was to implement a machine learning model, using limited data, for triage and prioritised reporting of dorsoventral thoracic radiographs similar to the red-dot system employed by medical radiographers.

Methods:

The imaging database at the authors institution was searched for cases that presented in respiratory distress or were reported as normal by a European diplomate or supervised resident in diagnostic imaging. 130 unlabelled DICOM images were randomly selected, exported and randomly allocated to training and validation groups and used to re-train the final layer of a popular convolutional neural network, *Inception V3*, utilising the TensorFlow machine learning framework.

Results:

Model evaluation was carried out on additional test cases (not utilised for model training or validation) [n=10] from the previous database interrogation. The model was able to correctly classify 100% of test cases, compared to the attending radiologist.

Discussion / Conclusion:

Triage and prioritised reporting of dorsoventral thoracic radiographs is feasible using machine learning with limited training data. Further prospective testing is required to outline the clinical diagnostic accuracy compared to radiologists, general practitioners and veterinary radiographers prior to clinical use.

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ULTRASONOGRAPHIC APPEARANCE OF CONFIRMED CHOLECYSTITIS IN DOGS

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⁴Small Animal Medicine, Cambridge Veterinary School, Cambridge, United Kingdom

⁵ Veterinary Clinical Sciences, Purdue University College of Veterinary Medicine, Purdue, United States of America

Introduction / Purpose:

In humans, studies have shown that patients diagnosed with cholecystitis may present persistent ultrasonographic changes of the biliary system. In veterinary literature there is a lack of information regarding the ultrasonographic appearance of the biliary tract during and after treatment of cholecystitis. The aim of this study was to compare the ultrasonographic appearance of the biliary system in dogs at initial presentation and after clinical resolution of cholecystitis.

Methods:

Medical records of dogs diagnosed with cholecystitis were reviewed from March 2015 to April 2020. The inclusion criteria were patients with confirmed diagnosis of cholecystitis by histopathology, cytology or bile culture and which had at least two sequential ultrasound examinations during the initial diagnosis and after clinical resolution of cholecystitis. All ultrasound images and videos of the intra/extrahepatic biliary ducts and gallbladder were reviewed to document the echogenicity and thickness of the walls, luminal content echogenicity and diameter.

Results:

Thirty-six dogs met the inclusion criteria. In the initial examination, the mean thickness of the gallbladder wall and diameter of the CBD were 5.5mm and 5.3mm, respectively. Bile content echogenicity was altered in 82% of patients. After clinical resolution, the mean thickness of the gallbladder wall was 4.2mm and the mean diameter of the CBD was 4.6mm. The bile echogenicity was unchanged in 77% of the patients and became unremarkable in the remaining 23%.

Discussion / Conclusion:

The thickened gallbladder wall and dilatation of the CBD could persist even after clinical resolution of cholecystitis. These should not be confused with failure of treatment.

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PREVALENCE OF ULTRASONOGRAPHIC GALLBLADDER WALL THICKENING IN DOGS WITH HYPOALBUMINEMIA

M. Murakami¹, H.G.H. Heng¹, M.S. Sola²

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²Comparative Pathobiology / Animal Disease Diagnostic Laboratory, Purdue University, West Lafayette, United States of America

Introduction / Purpose:

Gallbladder wall thickening due to hypoalbuminemia has been described in humans but not in dogs. Objective of this study is to describe the prevalence and ultrasonographic features of gallbladder wall thickening in dogs with hypoalbuminemia and analyze its correlation with serum albumin levels.

Methods:

Retrospective search in the medical records from 2018 to 2019 was performed. Ultrasound studies were reviewed and gallbladder wall thickness, layering appearance, echogenicity, echotexture, distribution of lesions, ultrasonographic evidence of gallbladder mucocele, and presence of peritoneal effusion were recorded. Mean serum albumin level of dogs with and without gallbladder wall thickening (>2mm) was compared.

Results:

Thirty-seven dogs with gallbladder ultrasound image and diagnosis of hypoalbuminemia (<2.3 g/dl) were included. Prevalence of gallbladder wall thickening in dogs with hypoalbuminemia was 13.5% (5/37 dogs). Mean gallbladder wall thickness of dogs with hypoalbuminemia was 1.19±0.70 mm. 3-layer appearance with inner and outer thin hyperechoic and thicker central hypoechoic layers were observed in 4 dogs and single hyperechoic layer was observed in one dog with gallbladder wall thickening. Circumferential wall thickening was observed in 5 dogs. Four dogs with gallbladder wall thickening had peritoneal effusion. Serum albumin level of the dogs with gallbladder wall thickening was not significantly different (p=0.14) from without gallbladder wall thickening.

Discussion / Conclusion:

Findings indicated that gallbladder wall thickening in dogs with hypoalbuminemia can be present. Ultrasonographically gallbladder wall thickening was very mild and commonly with 3-layer appearance. However, serum albumin levels did not correlate with the gallbladder wall thickening.

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ULTRASONOGRAPHIC EVALUATION OF ADRENAL GLAND THICKNESS IN HEALTHY CATS

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Introduction / Purpose:

The association between adrenal gland thickness and body weight has not been previously assessed in healthy cats. The objective of this study was to assess the association between feline body weight and adrenal gland thickness and to propose reference intervals (RIs) for adrenal gland thickness in healthy cats.

Methods:

Cross-sectional study, 39 healthy cats were included (10 cats =4 kg and 29 cats >4 kg). All cats underwent an ultrasound examination that was taken from a subcostal position. Maximum dorsoventral thicknesses of the left (MTL) and right (MTR) adrenal glands were measured in a sagittal plane. RIs were obtained for the maximum thickness (MT) that included MTL and MTR of each cat. RIs with the 90% confidence intervals of reference limits were calculated according to the ASVCP reference interval guidelines.

Results:

No statistical differences for adrenal gland thickness were observed between left and right ($p=0.543$) adrenal glands or between male and female cats ($p=0.943$). Mean MT was significantly greater in cats >4 kg compared to cats =4 kg (3.7 ± 0.6 vs 3.1 ± 0.5 mm; $p<0.005$). The lower limit of the RIs for MT was 2.3 (2.0-2.6) mm in cats =4 kg and 2.6 (2.4-2.8) mm in cats >4kg. The upper limit of the RIs for MT was 3.9 (3.7-4.3) mm in cats =4 kg and 4.8 (4.5-5.0) mm in cats.

Discussion / Conclusion:

The use of RIs based on two group sizes will allow a more accurate evaluation of ultrasonographic adrenal gland thickness in cats.

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CORRELATIONS BETWEEN RENAL DOPPLER SONOGRAPHY IN DOGS WITH CHRONIC KIDNEY DISEASE

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Introduction / Purpose:

The aim of this prospective study was to investigate any possible correlation between the renal vascular indices and the renal spectral waveforms architecture in dogs with histologically confirmed chronic renal disease (CKD).

Methods:

A total of 46 dogs were divided into the control group (G1: 22 dogs without any alterations in renal function) and the study group (G2: 24 dogs clinicopathologically diagnosed with CKD), respectively. The resistive and pulsatory indices values were automatically calculated by ultrasound machine upon manual delimitation on the spectral waveforms obtained for each kidney at the level of the interlobar renal artery under 0° angle Doppler correction. This was followed by ultrasound guided Tru-Cut biopsies of the left kidney for those diagnosed with CKD.

Results:

No statistically significant differences were noted regarding the values of the indices between the left and right kidney for patients included in G2 ($P=0.28$ and $P=0.31$) or between G1 and G2 ($P=0.19$ and $P=0.22$). Eleven dogs were diagnosed with severe interstitial fibrosis and all of them showed ultrasonographically the presence of shock waves, as well as a statistically significant difference between the velocity of the systolic peak and shortening of the systolic acceleration time. Five out of those 11 also presented retrograde flow.

Discussion / Conclusion:

The lack of differences between the values of vascular renal indices amongst groups suggests that these indices are not a reliable indicator for diagnosing CKD. Changes of the spectral waveforms of renal interlobar artery may be useful for diagnosing interstitial renal fibrosis.

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ABSTRACTS 18 SEPTEMBER 2020

Oral abstracts Friday

COMPARISON OF THREE MRI QUANTITATIVE SEQUENCES AND TWO DRAWING APPROACHES FOR ASSESSMENT OF LUMBAR DISC DEGENERATION IN AN OVINE MODEL

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Introduction / Purpose:

Quantitative MRI is developed to detect in-vivo early intervertebral disc degeneration (IVDD) in human and animal models. T2 and T2*-relaxation time measurements have been assessed in numerous studies but few have evaluated T1-mapping. An easy, reproducible standardized method of acquisition which can be applied in clinical studies is needed. Our objective was to compare T1-, T2- and T2*-mapping using two region-of-interest (ROI) drawing methods on the lumbar ovine disc to determine the most suitable and applicable approach for pre- and clinical studies.

Methods:

66 ovine discs were analyzed using T2-weighted 1.5T-MRI, variable-flip-angle T1-mapping and multi-echo T2- and T2*-mapping. 3-manual-drawn and 5-squared ROI methods were used to delineate the *Nucleus pulposus*(NP) and the *Annulus fibrosus*(AF) by two observers. Correlation with histology was assessed in 56 discs.

Results:

NP-ROI showed strong intra- and interrater agreement. All mapping sequences revealed a good correlation with qualitative Pfirrmann grading and Boos scoring ($p < 0,05$) except for the T2-ventral-AF-ROI. Correlations were excellent for all T1-ROI ($p < 0,01$) and T2*-NP-ROI ($p < 0,01$). Significant differences in T1-values were found between all Pfirrmann grades except grades I/II and grades III/IV. T2- and T2*-values showed significant differences between all grades except grades I/III.

Discussion / Conclusion:

Mapping MRI is an efficient tool to assess IVDD with an excellent repeatability and a strong correlation with histology, especially in the NP and its junction with the AF. While T2 and T2* mapping are well described, our data also highlight that variable-flip-angle T1-mapping deserves to be considered to assess the early events of IVDD in preclinical and clinical studies.

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RADIOGRAPHIC FEATURES OF EQUINE VERTEBRAL NEOPLASIA

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Introduction / Purpose:

Neoplasia involving the equine skeletal system is uncommon, with a prevalence of less than 1.5%. There are a few single published case reports describing vertebral tumours in horses. The aim of this study is to describe the radiographic features of equine vertebral neoplasia.

Methods:

A multicentre retrospective search of horses with histologically confirmed vertebral neoplasia and available radiographs of the area was performed. Radiographs were reviewed by two observers simultaneously and multiple radiographic features for each case were recorded (location, number of lesions, type of osseous changes, soft tissue involvement).

Results:

Eleven horses met the inclusion criteria. Final diagnoses included haemangiosarcoma (n=4), spindle cell sarcoma (n=2), osteosarcoma (n=2), undifferentiated sarcoma (n=2) and adenocarcinoma (n=1). Ataxia and stiffness were the most common clinical signs. Lesions were mainly identified in the cervical spine (10/11), with the ventral vertebral compartment being the most common location. A definitive radiographic pattern was not established, but all lesions were osteolytic with an osteoproliferative component in 7 out of 11. Polyostotic lesions and pathological fractures were identified in 3 and 4 horses, respectively. Horses with haemangiosarcoma had multiple lesions in other sites on necropsy.

Discussion / Conclusion:

Although neoplasia is an extremely rare disorder of the equine spine, it should be considered as a differential diagnosis when monostotic or polyostotic aggressive lesions are identified, especially affecting the ventral compartment and/or the cervical region. In horses with haemangiosarcoma, the most common type of neoplasia in this study, a thorough exam is recommended in order to identify additional lesions.

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INTER- AND INTRA-OBSERVER AGREEMENT AND RELIABILITY OF GRADING THORACOLUMBAR SPINOUS PROCESSES IN HORSES WITHOUT BACK PAIN ON PRE-PURCHASE RADIOGRAPHS

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Introduction / Purpose:

There is wide variability in radiographic alterations in thoracolumbar spinous processes in horses and these findings poorly correlate with the clinical appearance of back pain. Previous suggested scorings systems are all based on horses with clinical symptoms. Due to limitations in radiographic technique, major differences in horse's conformation and widespread of different radiographic abnormalities it is hypothesized that correct grading of such radiographs is unreliable. This research project investigates the agreement of grading radiographic findings of thoracolumbar spinous processes of healthy horses on pre-purchase examination amongst different trained observers.

Methods:

A retrospective study was conducted of a random sample of radiographic sets of the thoracolumbar spine during pre-purchase examination (N=100). Those sets were graded twice (0-3) by two different observers, one board-certified radiologist and one resident, for interspinous space width, cranial and caudal remodelling, increased opacity, radiolucent areas, dorsal remodelling, craniodorsal beak-shaped formations and isolated opacities dorsally. Inter- (P_{inter}) and intra-observer (P_{intra}) agreement was assessed using raw data percentage of agreement.

Results:

Inter- and intra-observer agreement was moderate to poor in most parameters except for interspinous space width ($P_{inter} = 0.93$; $P_{intra} = 0.94$), presence and size of radiolucencies ($P_{inter} = 0.80$; $P_{intra} = 0.87$), presence of osseous cyst like lesions ($P_{inter} = 0.94$; $P_{intra} = 0.95$), presence and size of isolated opacities ($P_{inter} = 0.86$; $P_{intra} = 0.91$).

Discussion / Conclusion:

Grading of thoracolumbar radiographs in horse without back pain showed poor inter- and intra-observer agreement for most parameters and these limitations should be considered especially in pre-purchase examinations.

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DIGITAL TOMOSYNTHESIS: TECHNICAL SET-UP AND CLINICAL APPLICATION IN THE EQUINE HEAD

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Introduction / Purpose:

Digital tomosynthesis (DT) is an x-ray-based imaging modality that acquires a series of several radiographic projections from a slightly different angle. This allows a volumetric reconstruction of the area of interest, providing a layer by layer assessment of the anatomy. DT is widely used in human medicine, with breast examination being its main application, with increasing use in thoracic and musculoskeletal imaging. DT is being introduced in the veterinary field; however, no reports are still available in the literature. A description of the technical set-up for DT examinations of the equine head, as well as its use in selected cases, is provided in this abstract.

Methods:

A retrospective review of cases referred for sinonasal and/or dental disorders was performed. All horses underwent DT examination as part of the diagnostic work-up. Data obtained from DT was compared to radiographic and clinical findings. Cases were grouped into periapical infection (n=8), paranasal sinus cyst (n=2) and skull fracture (n=1).

Results:

DT was performed uneventfully with the standing sedated patient. A basic DT examination consisted of at least one series acquired on a lateral projection with the plate on the diseased side of the head. DT images allowed an improved assessment of the anatomy compared to radiography. DT images correctly showed the primary lesion in all cases with higher detail than radiography and also allowed the identification of additional abnormalities.

Discussion / Conclusion:

DT is an excellent imaging tool for examining the equine head and allows a thorough assessment of the anatomy, reducing the superimposition of the surrounding structures.

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POSITIVE CONTRAST MAGNETIC RESONANCE AND COMPUTED TOMOGRAPHY BURSOGRAPHY FOR EVALUATION OF NAVICULAR BURSA ADHESIONS: PRELIMINARY STUDY

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Introduction / Purpose:

Magnetic Resonance (MRI) is considered the gold standard for podotrochlear apparatus assessment; however it was suggested that low field MRI may underestimate the presence of intrabursal adhesions phenomena. The aim of the present study was to evaluate the usefulness of CT and MR positive contrast navicular bursography for detection of adhesions affecting the podotrochlear apparatus ¹.

Methods:

Magnetic resonance and CT examination of 24 forelimbs collected from the abattoir were performed. After the native acquisition CT and MRI bursography was performed using a iodinated and paramagnetic contrast medium mixture. Adhesions were classified by a single observer as type 1 when a discontinuity in the navicular bursa fluid signal between two structures was visible, type 2 when ill-defined tissue was present between two structures, and type 3 when well-defined tissue was present between two structures². Adhesions were further classified according to the location: proximal, at the level and distal to the navicular bone.

Results:

Compared to pre-contrast exam, forty-one additional lesions were detected on post contrast CT, while twenty-two additional lesions were detected on post contrast MRI. Respectively, the number of pre and post contrast MRI detectable adhesions increased by 27 and 8 compared to CT.

Discussion / Conclusion:

In this study the use of positive navicular bursography allowed improved identification of lesions on both CT and MR. Post-contrast MRI was able to detect the highest number of adhesions. Based on these preliminary results, MR bursography might be considered in horses with palmar foot pain syndrome undergoing low field MRI examination.

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EFFECT OF FORELIMB CONFORMATION AND FOOT IMBALANCE ON THE COLLATERAL LIGAMENTS OF THE EQUINE DISTAL INTERPHALANGEAL JOINT

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Introduction / Purpose:

Correlations between foot conformation and pathology of the equine foot have been previously reported, however there are no studies that have investigated the effects of mediolateral foot imbalance and distal limb conformation on asymmetry and pathology of the collateral ligaments of the distal interphalangeal joint. The objective of this study was to find a positive correlation between mediolateral foot imbalance and/or distal limb conformation - defined as rotational deviation from the sagittal plane between the long axes of the three phalanges and third metacarpal bone - and collateral ligament asymmetry and desmopathy.

Methods:

120 limbs from 79 horses were included. Fifteen parameters were measured on dorsopalmar radiographs. On MRI images the percent variance in cross sectional area between the medial and the lateral collateral ligaments was measured at three sites and the presence and degree of T2W signal intensity was recorded. The data was analysed using a multivariate general linear model.

Results:

Increased ligament asymmetry was found to be positively associated with wider angles between the proximal and middle phalanges and, more mildly, between the distal and middle phalanges and the proximal phalanx and third metacarpal bone. The presence of increased T2W signal intensity in the medial collateral ligament was found to be positively associated with wider angles between the distal and middle phalanges and with age.

Discussion / Conclusion:

Distal limb conformation is associated with both asymmetry between the medial and the lateral collateral ligaments and with presence of abnormal signal intensity in the medial collateral ligament as measured on MRI.

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COMPUTED TOMOGRAPHIC AND HISTOPATHOLOGICAL CHARACTERISTICS OF 13 EQUINE AND 10 FELINE ORAL AND SINONASAL SQUAMOUS CELL CARCINOMAS

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Introduction / Purpose:

Squamous cell carcinoma (SCC) is an infiltrative malignant neoplasia and the most common sinonasal tumor in horses and oral tumor in cats. In humans, oral SCC is known for its heterogeneous biological and morphological character. The aim of this study was to describe radiologic-pathologic features of oral and sinonasal SCC.

Methods:

Two blinded radiologists retrospectively assessed CT characteristics of histopathologically confirmed oral and sinonasal SCC in horses and cats. One pathologist evaluated histological sections applying a human malignancy grading system for oral SCC using four grades with respect to morphological parameters of the tumor cells and the tumor-host relationship.

Results:

The sample comprised 13 horses and 10 cats. In horses, the epicenter of the mass was located in the paranasal sinuses (8/13), at the mandible (3/13), tongue (1/13) and nasal cavity (1/13). In cats, the epicenter was located at the level of the maxilla (4/10), mandible (3/10), tongue (1/10), buccal region (1/10) and diffusely distributed (1/10). Various CT features of osseous changes were recorded including the pattern of new bone formation (solid/lamellar, irregular, spiculated, Codman's triangle, amorphous/pumice stone-like), the pattern of cortical destruction (permeative, gross) and their respective degrees (mild, severe). Concerning the histopathologic grading, 4/13 horses and 1/10 cats were classified as grade 4, 8/13 horses and 8/10 cats were categorized as grade 3 and 1/13 horse and 1/10 cat were assigned to grade 2.

Discussion / Conclusion:

Further studies are warranted to elucidate a deeper radiologic-pathologic understanding of SCC in order to refine prognosis and targeted therapy.

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EVALUATION OF SHEAR WAVE ELASTOGRAPHY TO ASSESS CANINE LENS STIFFNESS IN AGING SUBJECTS AND IN CASE OF CATARACT

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Introduction / Purpose:

2-D shear wave elastography is a widely applied tool to assess tissue mechanical properties in healthy and diseased organs. This study aimed to investigate the possibility to assess the progressive lens age-related stiffness compared to lenses affected by cataract in dogs.

Methods:

Dogs were divided in four groups (group 1 <1.5 years, group 2 range 1.5-7 years, group 3 >7 years and group 4 dogs with cataract respectively) after a complete clinical and ophthalmological examination with owner consent. Trans-corneal B-mode US and elastography were performed under physical restraint with a Logiq S8 (GE Healthcare) and a linear probe (9L/10 MHz) with a 2-D shear wave elastography software. Triplicate kPa and m/s measurements were collected, and statistical analysis was performed with MATLAB 2020a.

Results:

44 dogs were included (mean age group 1 0.37 ± 0.07 years, group 2 4 ± 1.8 years, group 3 11.3 ± 1.3 years and group 4 9.7 ± 5.1 years). Mean stiffness expressed in m/s and kPa was respectively 3.1 ± 0.5 and 28.9 ± 9.2 for group 1, 4.6 ± 0.6 and 65 ± 18.4 for group 2, 6.46 ± 0.36 and 126 ± 14.6 for group 3, 5.83 ± 0.7 and 103 ± 24 for group 4. Significant differences ($P < 0.05$) were evidenced between all the 4 groups for both m/s and kPa measurements.

Discussion / Conclusion:

These preliminary results evidence that 2-D shear wave elastography is a feasible tool to assess age-related stiffness change in aging dogs and in case of cataract; wider groups of dogs affected by different types of cataract are needed to assess different grades of stiffness related to the underlying cataract etiology.

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ACCURACY OF LOW-FIELD MRI FOR DIFFERENTIATING INTERVERTEBRAL DISC EXTRUSIONS (IVDE) AND PROTRUSIONS (IVDP) AT THE LUMBOSACRAL DISC SPACE IN DOGS

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Introduction / Purpose:

MRI features differentiating extrusion from protrusion in thoracolumbar discs have been published, however little specifically evaluates the lumbosacral disc. The high prevalence of degenerative changes in apparently normal animals complicates assessment of this region and features relevant elsewhere in the spine may not apply. The aims of this study were 1) to determine the accuracy of MRI in differentiating IVDE and IVDP at the lumbosacral disc space in dogs, 2) to determine which MRI characteristics discriminate between IVDE and IVDP.

Methods:

MRI examinations from dogs with surgically confirmed IVDE or IVDP at the lumbosacral disc space were collected retrospectively (2011-2019). Two radiologists independently recorded a diagnosis of IVDE or IVDP, gave a confidence rating, and evaluated specific MRI features. Univariable statistical analysis was performed to identify which MRI characteristics may help distinguish IVDE from IVDP.

Results:

117 dogs with lumbosacral IVDE (n = 16) or IVDP (n = 101) were included. Overall diagnostic accuracy was 68.8% and interobserver agreement was fair (k = 0.37), increasing to 87% and almost perfect agreement (k = 0.87) in 'confident' diagnoses. Univariate analysis showed features associated with IVDE were: fragmented shape, lateralised herniations, cauda equina displacement, and extradural haemorrhage. Features associated with IVDP included: smooth shape, midline herniations, material confined to the disc space, the presence of nuclear cleft, spondylosis, L7-S1 subluxation, dorsal impingement and asymmetrical paraspinal musculature.

Discussion / Conclusion:

Diagnostic accuracy was lower than previously reported in herniations involving the thoracolumbar spine. MRI characteristics associated with chronic instability may also aid in differentiating lumbosacral IVDE and IVDP.

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CANINE OLIGODENDROGLIOMA GRADING BASED ON MAGNETIC RESONANCE IMAGING FEATURES

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Introduction / Purpose:

Oligodendrogliomas (OGs) account for up to 22% of primary brain tumours in dogs. Similarly to humans, canine OGs are graded as low (II) or high grade (III), based on the presence of microvascular proliferation and necrosis. Specific magnetic resonance imaging (MRI) features can reflect these histopathological characteristics. The aim of this retrospective study was to investigate if these MRI features differ between OGs grade II and III in dogs.

Methods:

Brain MRIs of dogs with histopathologically confirmed OG were evaluated for the presence of cavities, haemorrhages and necrosis based on tumours signal intensity, contrast enhancement and diffusion characteristics. MRI features were compared to low versus high grade OGs using Fisher's exact tests.

Results:

Thirty-two dogs, of them eight with grade II (25%) and 24 with grade III (75%) OGs, were included. Presence of cavities ($p=0.037$), haemorrhages ($p=0.033$) and necrosis ($p=0.005$) were associated with OG grade III. All OGs grade III showed strong contrast enhancement, including 18 with a ring or rim enhancement. None of the OGs grade II showed a strong contrast enhancement or ring/rim pattern. Diffusion weighted imaging was available in 17/32 dogs; no difference in the diffusion characteristics was detected between OGs grade II and III.

Discussion / Conclusion:

MRI is a useful tool for non-invasive ante-mortem prediction of the grade of canine OGs. Although the importance of brain tumour grading in dogs regarding prognosis and treatment options remains unknown, the results indicate that MRI reflects the histopathological features used for grading canine OGs.

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LYMPHOSCINTIGRAPHY FOR SENTINEL LYMPH NODE DETECTION: A MODERN APPROACH FOR PREOPERATIVE STAGING OF CANINE MALIGNANT TUMORS

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Introduction / Purpose:

Sentinel lymph node (SLN) mapping is the cornerstone for the oncological staging of solid malignancies in human patients. This study aims to describe the feasibility of preoperative planar lymphoscintigraphy for SLN detection in canine patients with spontaneous malignant tumors.

Methods:

Client owned dogs with confirmed malignant neoplasia, no palpable regional lymph nodes and absence of distant metastasis, were prospectively enrolled in this observational study. Lymphoscintigraphy was performed after peritumoral injection of Technetium-99m labeled human serum albumin. Both regional dynamic and static images were acquired, with and without masking the injection site with a lead shield, until the first draining lymph node was identified. Dogs were then admitted to surgery for tumor excision and SLN extirpation. Intraoperative SLN detection was performed combining methylene blue dye and a gamma probe.

Results:

Fifty-one dogs for a total of 59 solid malignant tumors were enrolled. Planar lymphoscintigraphy allowed the identification of at least one SLN in 56/59 cases (95%). The SLN did not always correspond to the regional lymphosome (34/56, 60.7%). The use of a lead shield masking the injection site markedly improved the SLN visualization. The median time of SLN appearance was 11.4±9.3 minutes (range: 1-42 minutes). No side effects were recorded.

Discussion / Conclusion:

Preoperative lymphoscintigraphy is a feasible technique for SLN detection in dogs. The combined use of preoperative and intraoperative techniques is recommended to increase SLN detection rate.

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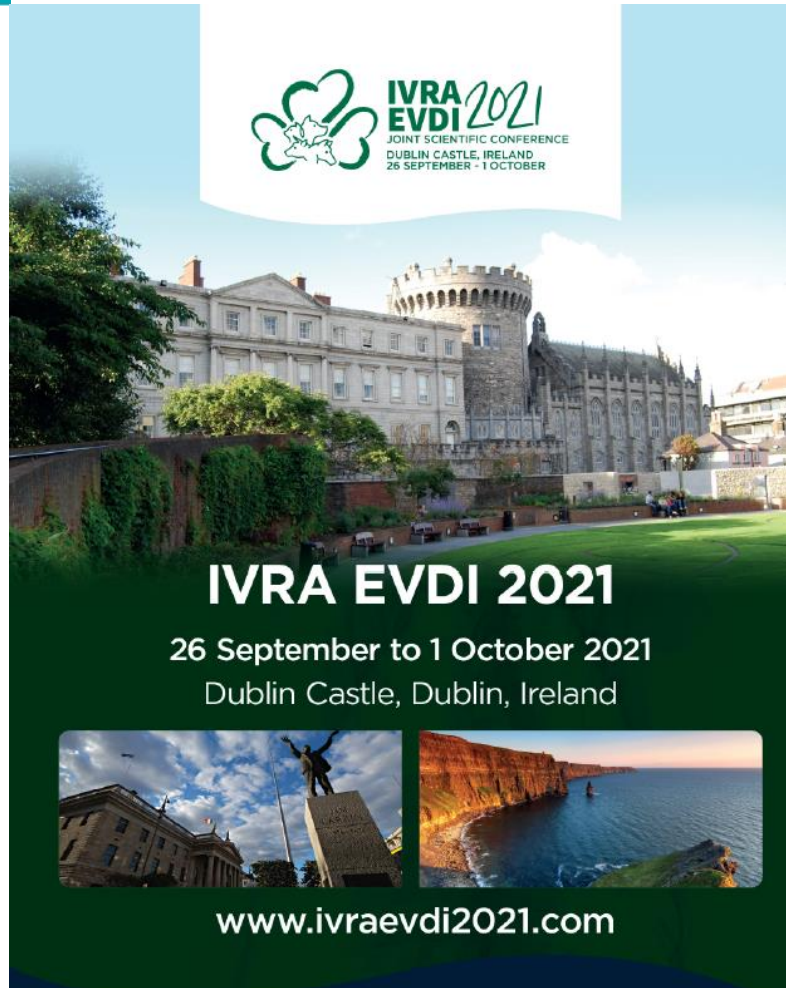
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