

#### CHARACTERIZATION OF CANINE MAMMARY TUMOURS USING B-MODE, COLOUR AND PULSED DOPPLER ULTRASONOGRAPHY

Novellas R, Ruiz de Gopegui R, Domínguez E, García A, Solanas L, Puig J, Rabanal R, Espada Y. Autonomous University of Barcelona, Animal Medicine and Surgery Department, Diagnostic Imaging Service, Veterinary Teaching Hospital, Bellaterra, Spain.

##### Introduction

Mammary tumours are the most frequent neoplasias in non spayed female dogs. The gold standard to diagnose mammary neoplasia is excisional biopsy histopathology. This study intends to describe ultrasonographic appearance, to study vascularisation and vascular indices of mammary neoplasias in order to correlate tumour type with malignancy or histopathology.

##### Materials and Methods

Seventy mammary masses from forty dogs with histologically confirmed malignant or benign mammary tumour, mammary hyperplasias/dysplasias, and mammary lipomas were included in the study. All ultrasound studies were performed with an 11 MHz linear transducer. B-mode, pulsed, colour or power Doppler ultrasonography was performed to describe the ultrasonographic appearance, categorize the vessel distribution and signal type, and calculate the vascular indices. All the sonographic findings were correlated with histological results. Histopathology was performed in the mammary excisional biopsies.

##### Results

Tumour types were classified following the WHO criteria into malignant (complex carcinoma 25, tubulopapillary carcinoma 9, solid carcinoma 4, carcinoma in benign tumour 3), benign (adenoma-simplex 6, complex 6-, benign mixed tumour 9, duct papilloma 1), mammary lobular hyperplasia 2, duct ectasia 1) and mammary lipoma 4. Malignant tumours had higher volumes, had more irregular shapes and showed enhancement and anechoic areas than benign tumours. Most of the tumours, either benign or malignant were hypochoic. Shadowing and mineralized focal areas were observed in a similar proportion. Central and mixed vascularisation was more frequent in malignant than in benign tumour. Among malignant, in the complex carcinoma vascular flow was not detected in 11/25. Malignant tumours showed a tendency to present lower minimum and higher maximum resistive index. The differences between them were higher in malignant tumours.

##### Discussion/Conclusions

Although tendencies were observed, the ultrasonographic findings between malignant and benign mammary tumours were non statistically significant, and histopathology is required for the diagnosis.

##### References

- Lee S-W, Choi HY, Baek SY, Lim SM. Role of color and power Doppler imaging in differentiating between malignant and benign solid breast masses. *J of Clinical Ultrasound* 2002; 30:459-464.
- Mesaki K, Hisa N, Kubota K, Hisa Nobuaki, Ogawa Y, Yoshida S. Differentiation of benign and malignant breast tumors using Doppler spectral parameters including acceleration time index. *Oncology Reports* 2003; 10:945-950.
- Misdorp W, Els RW, Hellmén E, Lipscomb TP. Histological classification of mammary tumors of the dog and cat. WHO International Histological Classification of Tumours of Domestic Animals (1999) 2nd Series, vol. VII. Washington DC.
- Nyman HT, Kristensen AT, Lee MH, Martinussen T, McEvoy FJ. Characterization of canine superficial tumors using gray-scale B mode, color flow mapping, and spectral Doppler ultrasonography – A multivariate study. *Vet Rad&Ultrasound* 2006; 47:192-8.
- Benjamin SA, Lee AC, WJ Saunders. Classification and behaviour for canine mammary epithelial neoplasm based on life-span observations in Beagles. *Vet Pathol* 1999; 36:423-6.

#### COMPARISON OF TRANSABDOMINAL AND TRANSRECTAL ULTRASONOGRAPHY OF THE PROSTATE GLAND IN DOG

Ghadiri A, Avizeh R, Baniadam A, Ranjbar A. Shahid Chamran University, Faculty of Veterinary Medicine, Department of Clinical Sciences, Ahvaz, Iran.

##### Introduction

The aims of this study were: to compare the transabdominal and transrectal ultrasonography of the prostate gland in dogs, to estimate the dimension, volume and weight of the prostate gland and to derive a simple formula from actual and ultrasonographic prostate measurements.

##### Materials and Methods

Reasons other than prostatic disease. Longitudinal and transverse sections were obtained and prostate length (L1), depth (D1) and width (W1) were measured in cm in transabdominal technique. But in transrectal procedure only prostate length (L2) and depth (D2) were obtained. Prostatic volume was calculated using the formula for the volume of an ellipsoid (PVE) and for a box (PVB). The actual prostate length, depth, width, weight and volume (V) were measured after euthanasia. All statistical analyses were performed using SPSS 0.9 software.

##### Results

The study was performed on 10 intact mongrel male dogs that required euthanasia for Mean  $\pm$  SD of the L1, D1 and W1 were  $3.35 \pm 0.4$ ,  $3.42 \pm 0.53$  and  $2.78 \pm 0.5$  and L2 and D2 were  $3.01 \pm 0.32$  and  $2.3 \pm 0.32$  cm respectively. There was highly significant correlation between prostatic parameters calculated from transabdominal and transrectal ultrasonography and their actual dimension ( $P \leq 0.001$ ). Based on linear regression the equations comparing actual prostatic volume to calculated volume are:  $V = 0.427 \text{ PVB} - 0.883$  ( $R^2 = 0.984$ ) and  $V = 0.796 \text{ PVE} - 0.402$  ( $R^2 = 0.977$ ). In transrectal ultrasonography there were not seen any damage to rectum and the time for evaluation of the prostate gland was faster than transabdominal method.

##### Discussion

Transrectal ultrasonography had been found to be a simple, quick and noninvasive method for evaluating the prostate gland in the dog. Prostatic dimensions in transabdominal method in this study were slightly greater and in transrectal method was smaller than other studies.

#### CT-ANATOMY OF THE BRACHYZEPHAL AND NORMAL FELINE NASOLACRIMAL DRAINAGE SYSTEM

Nöller C. University of Leipzig, Department of Small Animals, Leipzig, Germany.

##### Introduction

As a consequence of their head conformation Persian cats regularly suffer from epiphora. The obvious differences between brachy- and normocephalic cats are the "missing" or shortened nose and discoloring of skin. Therefore the objective of this study was to evaluate the course of the nasolacrimal drainage system (NDS) in brachycephalic cats in comparison to normal shaped breeds using computed tomography.

##### Materials and Methods

This anatomic and computed tomographic study is based on 47 heads (29 brachycephalic, 18 mesocephalic) of euthanized or anaesthetized cats. In six cases CT-dacryocystorhinography of the NDS were carried out using a casting media (mixture of barium sulphate and silicone rubber) or an iodinated contrast medium (mixture of contrast medium and methyl cellulose), respectively. Additionally 3D-reconstructions, dissections, and macerations were produced.

##### Results

A final stage of brachycephaly results in a high-graded dislocation of nasal structures (especially the ventral nasal concha) caused by dorso-rotation of teeth. The canine tooth is the main barrier for the NDS which originates laterally and drains medially into the nose. In case of a missing nose, the duct passed below this tooth. Furthermore the NDS is characterized by an increased angle and a steeper course.

##### Discussion-Conclusion

Normally tears pass into the NDS by a process of gravity feed (among others). The dorso-rotation of the canine tooth and the ventral nasal concha is the reason for the steeper course that forces the lacrimal fluid to drain uphill. This hinders the drainage and might result in epiphora, the obvious resenting sign in Persian cats.

##### References

- BREIT, S., KÜNZEL, W., OPPEL, M. (2003): The Course of the Nasolacrimal Duct in Brachycephalic Cats. *Anat Histol Embryol*, 32, S. 224-227.
- NÖLLER, C., HENNINGER, W., GRÖNEMEYER, D. H. W., HIRSCHBERG, R. M., BUDRAS, K.-D. (2006): Computed tomography-Anatomy of the normal feline nasolacrimal drainage system. *Vet Radiol Ultrasound*, 47 (1), S. 53-60.

#### CT- AND MR-DACRYOCYSTOGRAPHY OF THE NORMAL CANINE NASOLACRIMAL DRAINAGE SYSTEM: PRELIMINARY RESULTS IN 15 DOGS

Rached PA, Ludewig E, Oechtering G, Nöller C. University of Leipzig, Department of Small Animals, Leipzig, Germany.

##### Introduction

Conventional radiographic cannulation dacryocystography is a commonly used technique for visualizing disorders of nasolacrimal drainage system (NDS) in dogs. However, superimposition of structures can compromise the diagnosis. Although there are no studies with CT- and MR-dacryocystography (CTD and MRD) in dogs, it is expected that they could be useful in the diagnosis of nasolacrimal diseases in dogs. The aims of this study are to develop CTD and MRD protocols and to describe possible variations in the NDS anatomy of dogs with different skull conformations.

##### Materials and Methods

Up to now, cadavers from 15 dogs free of ocular and nasal disease were included. The upper lacrimal canaliculi were cannulated and contrast media were injected (Imeron<sup>®</sup> and Omniscan<sup>®</sup> 1:200, for CTD and MRD respectively). CT transverse and 3D images were obtained using 0.8 to 2 mm-thick slices. MRD protocol included transverse images obtained by T1W/3D/FFE and PDW/TSE sequences.

##### Results

In CT scans, the upper and the lower lacrimal canaliculi, lacrimal sac and nasolacrimal duct could be well described in all 15 dogs. The differentiation between the bony and membranous part of the nasolacrimal duct was easily performed. MRD images required longer scan time and allowed the visualization of NDS structures in a lower percentage of dogs.

##### Discussion/Conclusion

CTD and MRD are useful techniques for evaluation of the NDS in dogs. The protocols can be recommended. CTD was shown to be a more reliable technique for anatomical description of the NDS with high spatial resolution. MRD provided more information about the surrounding soft tissue structures.

##### References

- NÖLLER, C., HENNINGER, W., GRÖNEMEYER, D. H. W., HIRSCHBERG, R. M., BUDRAS, K.-D. (2006): Computed tomography-Anatomy of the normal feline nasolacrimal drainage system. *Vet Radiol Ultrasound*, 47 (1), S. 53-60.
- NYKAMP, S.G. SCRIVANI, P.V. PEASE, A.P (2004): Computed tomography dacryocystography evaluation of the nasolacrimal apparatus. *Vet. Radiol. Ultrasound* 45(1), S. 23-28.

# ABSTRACTS FROM THE ANNUAL CONFERENCE OF THE EUROPEAN ASSOCIATION OF VETERINARY DIAGNOSTIC IMAGING

Porto Carras, Chalkidiki, Greece  
August 29–September 1, 2007

*Veterinary Radiology & Ultrasound, Vol. 49, No. 2, 2008, pp 196–219.*

## HEMODYNAMIC ALTERATIONS CAUSED BY 3 TYPES OF INTRAVENOUS CONTRAST MEDIA IN ANESTHETIZED DOGS

Pollard RE, Puchalski SM, Pascoe PJ. Department of Surgical and Radiological Sciences University of California, Davis School of Veterinary Medicine, Davis, CA 95616.

### Introduction

The purpose of this retrospective study was to determine the incidence of alterations in physiological parameters such as heart rate (HR) and peak systolic blood pressure (BP) associated with intravenous (IV) administration of ionic iodinated, non-ionic iodinated and gadolinium contrast agents in anesthetized dogs.

### Materials and Methods

UC Davis SVM records were searched for dogs receiving IV ionic iodinated (Conray), non-ionic iodinated (Isovue) and gadolinium (Magnevist) contrast agents during anesthesia between 4/2005–4/2006. For both control and study groups, HR and BP were recorded at 5-minute intervals for 20 min. Baseline data for each dog was defined as the measurement immediately prior to contrast administration in the study group and 15 min after the beginning of the MRI in the control group. A  $\geq 15\%$  change in HR or BP was considered a response. The percent change from baseline was calculated for each time point.

### Results

38/87 (44%) of dogs receiving Conray had a response in HR at 1 or more time points. 44/87 (51%) of dogs receiving Conray had a response in BP. 4/17 (24%) of dogs receiving Isovue had a response in HR while 4/17 (24%) had a response in BP. 24/84 (29%) of dogs receiving Magnevist had a response in HR while 22/84 (26%) had a response in BP. 5/36 (14%) of control dogs had a response in HR while 7/36 (19%) had a response in BP.

### Discussion/Conclusions

Administration of ionic iodine contrast agents is more commonly associated with  $\geq 15\%$  change in HR and/or BP than control dogs or those receiving other contrast agents.

## DOPPLER ULTRASOUND EVALUATION AND MONITORING OF GASTROINTESTINAL HEMODYNAMICS IN DOGS WITH CHRONIC ENTEROPATHY: A CLINICAL STUDY

Güdel AK<sup>1</sup>, Kircher P<sup>1</sup>, Allenspach K<sup>1</sup>, Gaschen F<sup>2</sup>, Doherr MG<sup>1</sup>, Lang J<sup>1</sup>, Gaschen L<sup>2</sup>.  
<sup>1</sup>Vetsuisse Faculty Bern, University of Bern, Switzerland; <sup>2</sup>School of Veterinary Medicine, Louisiana State University, USA.

**Introduction** Distinguishing inflammatory bowel diseases by B-mode ultrasonography is poor. The purpose of this prospective study was to investigate if food responsive (FR), steroid responsive (SR) and protein losing enteropathy (PLE) can be differentiated based on Doppler ultrasound parameters and to monitor therapy.

**Materials and Methods** The study group consisted of 37 dogs. They were grouped into FR, SR and PLE entities and graded clinically (CIBDAI) and by Doppler sonography at presentation, at four and 10 weeks after therapy initiation. Blood flow of the celiac (CA) and cranial mesenteric arteries (CMA) was measured and the RI and PI values were calculated.

**Results** All groups clinically improved within the first month. The FR group showed normal RI and PI values during the whole study compared to healthy dogs<sup>1</sup>, the SR and PLE groups, however, had significantly lower fasted RI and PI values (CMA-RI at t0: FR = 0.799  $\pm$  0.059, SR = 0.783  $\pm$  0.062, PLE = 0.779  $\pm$  0.063; CMA-PI at t0: FR = 2.282  $\pm$  0.526, SR = 2.188  $\pm$  0.499, PLE = 2.174  $\pm$  0.523). After four weeks all groups showed normal flow pattern over time (CMA-RI at t0: FR = 0.798  $\pm$  0.006, SR = 0.801  $\pm$  0.006, PLE = 0.794  $\pm$  0.007; CMA-PI at t0: FR = 2.386  $\pm$  0.521, SR = 2.399  $\pm$  0.561, PLE = 2.581  $\pm$  0.581). At 10 weeks, the FR and the PLE group remained normal.

**Conclusion** We could demonstrate significantly different blood flow characteristics in dogs with SR and PLE before and during therapy, which correlated well with the CIBDAI. The FR group differed from the other disease entities in having physiological hemodynamic values pre- and post therapy.

1. Kircher P, Lang J, Blum J, Gaschen F, Doherr M, Sieber C, Gaschen L. Influence of food composition on splanchnic blood flow during digestion in unsedated normal dogs: a Doppler study. *Vet J* 2003;166(3):265–272.

## INFLUENCE OF IOHEXOL ON THE OUTCOME OF I131 TREATMENT IN CATS

Vandermeulen E<sup>1</sup>, Bacher K<sup>2</sup>, Dobbelaire A<sup>1</sup>, van Hoek I<sup>3</sup>, Daminet S<sup>3</sup>, Vermeire S<sup>1</sup>, Pere-mans K<sup>1</sup>. <sup>1</sup>Ghent University, Faculty of Veterinary Medicine, Department of Medical Imaging, Ghent, Belgium; <sup>2</sup>Ghent University, Faculty of Medicine and Health Science, Department of Human Anatomy, Embryology, Histology and Medical Physics, Ghent, Belgium; <sup>3</sup>Ghent University, Faculty of Veterinary Medicine, Department of Medicine and Clinical Biology of Small Animals, Ghent, Belgium.

**Introduction** Iohexol was investigated as GFR-marker to assess kidney function in hyperthyroid cats. This study aims to evaluate whether administration of iohexol one day prior to treatment with radioactive iodine (I131) influences the absorbed dose and long-term outcome.

**Materials and Methods** 43 hyperthyroid cats, presented for I131-treatment, were included. GFR measurement using iohexol (64.7 mg/kg) was performed in 11 patients one day before injection of I131. 32 cats received only I131 and functioned as control-group. The iohexol-group received an average activity of 109 MBq I131 (SD  $\pm$  17 MBq); the control-group received on average 111 MBq I131 (SD  $\pm$  16 MBq). Scintigraphic scans were performed 24, 48 and 120 h post-therapy. A syringe with known reference activity was scanned using the same parameters. ROI's were drawn over the thyroid region, background and reference activity for all time points. Cumulative activity was calculated. A factor was obtained using MIRDOSE3.1 software converting the cumulative activity into absorbed dose, taking into account the thyroid volume.

**Results** The mean estimated absorbed thyroid dose in the iohexol-group was 54 Gy (SD  $\pm$  9 Gy), which was significantly different from the control group: 84 Gy (SD = 12 Gy) ( $P < 0.01$ ). Of the cats that received iohexol, a higher percentage remained hyperthyroid (18%) 3 months after treatment compared to the control group (7%). These results however did not reach significance ( $P > 0.1$ ,  $\chi^2$ -test).

**Discussion-Conclusion** Administration of iohexol for kidney evaluation reduces absorbed thyroid dose of I131 but does not influence long-term outcome of feline hyperthyroidism in this small group.

### References

1. Nygaard B, Nygaard T, Jensen LI, Court-Payen M, Soe-Jensen P, Nielsen KG, Fugl M, Hansen JM. Iohexol: effects on uptake of radioactive iodine in the thyroid and on the thyroid function. *Acad Radiol* 1998;5:409–414.
2. Miyamoto K. Clinical application of plasma clearance of iohexol on feline patients. *J Fel Med Surg* 2001;3:143–147.
3. Miyamoto K. Use of plasma clearance of iohexol for estimating GFR in cats. *Am J Vet Res* 2001;62:572–575.
4. Goy-Thollot I, Chafotte C, Besse S, Garnier F, Barthez PY. Iohexol plasma clearance in healthy dogs and cats. *Vet Radiol Ultrasound* 2006;47:168–173.

## ULTRASONOGRAPHY OF OVINE CONGENITAL POLYCYSTIC KIDNEY DISEASE

Owen MC<sup>1</sup>, Johnstone AC<sup>2</sup>. <sup>1</sup>Veterinary Teaching Hospital; <sup>2</sup>Department of Pathobiology Institute of Veterinary, Animal & Biomedical Sciences Massey University, New Zealand.

### Introduction

Congenital polycystic kidney disease (PKD) has been described in domestic animals and humans in autosomal dominant (ADPKD) and recessive (ARPKD) forms. ADPKD is a disease of adult onset of Persian cats and Bull Terriers, while ARPKD is a disease of early onset in Cairn and West Highland White Terriers, Persian cats, a goat and Coopworth and Perendale sheep. ARPKD of sheep is characterised by renal, biliary (intra- and extra- hepatic), pancreatic and epididymal ductal dysplasia and/or cysts. The ultrasonographic change in PKD in lambs has not been previously described.

### Materials and methods

In-utero abdominal ultrasound (Philips HDI 3000, C8-5) of the foeti was performed on 25 in-lamb ARPKD heterozygote Perendale ewes that had been mated to two heterozygous rams. Two new-born lambs with ARPKD were also examined ultrasonographically.

### Results

In-utero ultrasound of the 10 affected lambs showed marked enlargement and distortion of renal cortex and medulla. A large number of 1–3 mm hypochoic cysts were spread diffusely throughout the parenchyma. The renal pelvises were not identifiable. Abdominal ultrasound examination immediately after birth of affected lambs showed similar changes within the kidneys but also marked cystic dilatation of the extrahepatic bile and pancreatic ducts.

### Conclusions

In-utero ultrasound of affected foeti clearly identified renal cysts but not hepatic or pancreatic changes. The hepatic and pancreatic cysts could be identified postnatally.

Johnstone AC, Davidson BI, Roe AR, Eccles MR & Jolly RD. Congenital polycystic kidney disease in lambs. *New Zealand Veterinary Journal*. 2005;53(5): 307–314.