

Scientific Presentation Abstracts

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SMALL ANIMAL

Short Communication

RESULTS OF SURGICAL TREATMENT OF ADRENAL TUMORS WITH OR WITHOUT INVOLVEMENT OF THE VENA CAVA: 42 DOGS (1993–2003). F. Bernard*¹, E. Monnet*², EJ Ehrhart*², S. J. Withrow*². ¹University College Dublin, Belfield, Ireland; ²Colorado State University, Fort Collins, Colorado, USA.

Introduction: The purpose of this study was to evaluate the effect of involvement of the vena cava on outcome of dogs surgically treated for adrenal tumor.

Material and Methods: Medical records of dogs surgically treated for an adrenal mass were reviewed for signalment, duration of signs prior to presentation, complete blood count values, serum chemistry panel values, concurrent diseases, adrenal gland affected, histopathologic diagnosis, surgical procedure, caudal vena cava involvement, and development of complications. Short-term survival was defined as within 14 days after surgery. Proportional hazard univariate analysis was used to evaluate risk factors for survival.

Results: Eight dogs were diagnosed with an adrenocortical adenoma, 22 with an adrenocortical carcinoma, and 12 with a pheochromocytoma. Eight dogs had involvement of the vena cava. Involvement of the vena cava (HR: 5.5, 95% CI: 2.2–24.0, $p=0.002$), nephrectomy (HR: 3.0, 95% CI: 1.3–7.0, $p=0.002$), transfusion during anesthesia (HR: 5.4, 95% CI: 2.0–24.0, $p=0.0003$), DIC (HR: 7.9, 95% CI: 2.4–37.0, $p=0.0006$), hypotension (HR: 5.1, 95% CI: 1.8–22.8, $p=0.002$), and peritonitis (HR: 3.6, 95% CI: 1.2–10.4, $p=0.02$) were risk factors for short-term survival. Extensive involvement of the vena cava extending cranially to the hepatic veins was a risk factor for short-term survival (HR: 8.2, 95% CI: 3.0–37.3, $p<0.0001$). Involvement of the caudal vena cava had no effect on long-term survival (HR: 2.6, 95% CI: 0.5–8.3, $p=0.19$).

Discussion/Conclusion: Involvement of the vena cava is associated with a higher surgical mortality rate but it does not affect the long-term prognosis in dogs with an adrenal mass. The extent of the vena cava involvement should be determined before surgical treatment of adrenal tumor.

INVESTIGATION OF MENISCAL INTEGRITY IN DOGS WITH NATURALLY OCCURRING CRANIAL CRUCIATE LIGAMENT DISEASE BY USE OF LOW-FIELD MRI: A PROSPECTIVE STUDY WITH ARTHROSCOPY AS GOLD STANDARD. Böttcher P.*¹, Brühshwein A.[#], Winkels P., Oechtering G., Ludewig E. ¹University of Leipzig, Germany; [#]Ludwig-Maximilians-University, Munich, Germany.

Introduction: The reported incidence of meniscal tears in dogs with concurrent cranial cruciate ligament (CrCL) disease is as high as 77.3%. Persistent or recurrent lameness attributed to meniscal injury missed during surgical CrCL reconstruction has been reported to occur in 6.3% to 17.4% of the cases. Non-invasive investigation of meniscal integrity might be performed using ultrasonography, computed tomography or magnetic reso-

nance imaging (MRI). The aim of the study was to investigate the accuracy of low-field MRI (lfMRI) in diagnosing substantial meniscal tears in a larger group of dogs affected by natural CrCL disease.

Material and Methods: 42 consecutive knees of medium or large breed dogs with suspected CrCL insufficiency were investigated. Each stifle underwent a predefined protocol of 7 different MRI sequences in the 3 orthogonal planes using a 0.5 Tesla magnet with a human knee coil (Philips Gyroscan T5-NT). Following lfMRI standard diagnostic arthroscopy was carried out. A combination of various hooks, retractors and a specially designed knee-distractor allowed for unconstrained visualization and palpation of both menisci, especially in the caudomedial compartment. lfMRI images were read and scored, following a defined scoring system, by one investigator who was unaware of the intraoperative findings. Based on the evaluation of the complete lfMRI study the investigator was asked whether he suspected macroscopic meniscal damage, which necessitates further inspection and/or surgery?

Results: Arthroscopy identified 21 knees with meniscal tears which required subtotal meniscectomy. Out of these only 13 were identified by lfMRI. Overall sensitivity and specificity of lfMRI in detecting meniscal tears was 0.62 (95%CI: 0.41–0.79) and 0.86 (95% CI: 0.65–0.95), respectively. Three cases which MRI judged as having a meniscal tear could not be confirmed by arthroscopy. The positive and negative predictive values were 0.81 (95% CI: 0.57–0.93) and 0.69 (95% CI: 0.50–0.83), respectively.

Discussion/Conclusion: lfMRI as used in this study was found to be of low diagnostic accuracy in detecting substantial meniscal tears.

PARTIAL LATERAL CORPECTOMY: TECHNICAL EXPERIENCE IN 51 DOGS. Flegel T., Boettcher I.C., Ludewig E., Oechtering G., Böttcher P.*¹Department of Small Animal Medicine, University of Leipzig, Germany.

Introduction: Partial lateral corpectomy (PLC), a technique for the removal of ventrally located thoracolumbar disc material, was described in a series of 15 dogs by Moissonnier et al., (Vet Surg 2004). Since then no further studies have been published evaluating PLC in regard to its associated complications and potential to achieve decompression in a larger group of dogs. The aim of the present study was to document the extent of decompression of the spinal cord, slot dimensions as well as type and frequency of surgical complications.

Material and Methods: 51 dogs met the criteria for inclusion being presented with signs of thoracolumbar intervertebral disc disease (IVDD) with ventral or ventrolateral located extradural spinal cord compression. Indication for PLC was based on myelography, computed tomographic (CT) myelography or magnetic resonance imaging. Spinal decompression and slot parameters were evaluated postoperatively using CT-myelography in 48 dogs and plain CT in 3 dogs.

Results: 43 dogs had a single PCL performed, whereas 7 dogs had 2 and 1 dog 3 corpectomies performed during the same surgical procedure. Postsurgical decompression of the spinal cord was considered complete in 58% and good in 32% localizations. Immediate revision had to be performed in 17%. The resulting median slot dimensions were: 66% of vertebral body width for laterolateral extension, 43% of the vertebral body height for dorsoventral extension, 25% and 22% of the cranial and caudal vertebral body

length for craniocaudal extension. In 25% of cases, the slot was angled ventrally more than 10° off the horizontal, making decompression more difficult. Partial rib resection was performed in 15%, whereas rib disarticulation without resection was deemed necessary in another 5% of PLC. Surgical complications included significant hemorrhage from the venous sinus (25%), separation of the spinal nerve (12%) and laceration of the dura mater (5%). Pneumothorax was present in 31% of 35 dogs evaluated in this regard.

Discussion/Conclusion: Ventral or ventrolateral spinal cord compression following IVDD can be successfully resolved using PLC in the majority of the cases, but residual compression might remain unnoticed during surgery. Overall, complications are numerous rendering PLC a challenging procedure.

A RETROSPECTIVE STUDY OF 154 CASES OF PATENT DUCTUS ARTERIOSUS. Bussadori R., Repetto S.M., Vinci C., Bussadori C.M. Clinica Veterinaria Gran Sasso, Milano, Italy.

Introduction: Botallo's duct is a blood vessel that connects the pulmonary artery and the descending aorta during the foetal life. Just after birth it usually closes, but when this does not occur, Patent Ductus Arteriosus (PDA) develops.

Materials and Methods: Clinical data of patients affected by PDA and treated by surgical closure were reviewed. We included both patients where a traditional closure was chosen as a first choice and those in which it was not possible to perform a minimally invasive surgery. Preoperative work-up included physical examination, a complete blood cell count and biochemistry, coagulation profile, X-Rays, electrocardiography and echocardiography.

One hundred and fifty-four cases of PDA were included (152 dogs and 2 cats); we have evaluated sex, age and breed predisposition. We have considered besides thoracic radiographic evidence, ecocardiographic studies and different surgical techniques.

Results: Intraoperative complications included ventricular fibrillation (2 cases out of 154, of which 1 defibrillated and 1 died), intraoperative duct rupture (3 cases out of 154; the duct was repaired and closed successfully), acute pulmonary hypertension (1 out of 154 cases, deceased) and residual shunting (1 case out of 154, not hemodynamically important).

The surgical "skin to skin" time varied between twenty minutes and ninety minutes in a case of rupture of the duct.

Conclusion: PDA surgical ligation in experienced hands is a relatively low risk surgery with relatively few complications mostly related to the severity of the cardiac failure and the dilatation of the ductal ampulla. Compared to interventional percutaneous closure traditional open approach surgery has the advantage of lower cost and it is applicable for any size of animals and for any ductal dimension.

TOTAL HIP REPLACEMENT IN DOGS AFFECTED BY TRAUMATIC HIP JOINT PATHOLOGY. F. Cappellari, L.A. Piras, E. Panichi, P. Buracco*, B. Peirone. Department of Animal Pathology, University of Turin, Italy.

Although coxofemoral pain is most commonly associated with canine hip dysplasia, it can also arise from primary osteoarthritis unrelated to canine hip dysplasia, chronic hip luxations, failed femoral head and neck osteotomies (FHNO), severe femoral head or neck fractures, malunions after acetabular, femoral head, or neck fractures, and from avascular necrosis of the femoral head. Total hip replacement (THR) has been recommended for the surgical management of coxofemoral pain in patients affected with these conditions; however studies assessing their outcome are lacking.

The objective of this study was to review the long-term outcome of dogs affected with non-dysplastic hip conditions treated with a cementless THR system (Kyon, Zurich). Nine dogs affected by traumatic hip disease treated with cementless THR were included in the study. Diagnoses included: traumatic hip luxation (n = 3), non-union of femoral head fracture (n = 3), femoral neck fracture (n = 1), femoral head avulsion fracture (n = 1) and pseudoarthrosis secondary to FHNO (n = 1). Signalment, body weight, diagnosis, implant size, surgical technique, and intraoperative and postoperative complications were reviewed. Radiographic follow-up was performed at least 3 months after surgery in all patients. An owner survey was used to obtain long-term follow-up at least 8 months after surgery. Complications occurred in 3 of the 9 cases. In one case, a THR was attempted, but subsequently converted to FHNO due to evident joint laxity which would have resulted in a high risk of luxation. Postoperative complications included: luxation of the acetabular component (n = 1) and breakage of the femoral stem (n = 1). Both cases were treated successfully by revision surgery. All dogs except one (graded as mildly abnormal) were determined to be free of lameness and other disabilities eight months or more after surgery according to the owner-completed survey. In conclusion, our findings suggest that THR can be a successful treatment for traumatic coxofemoral pathology in dogs.

TRANSOBTURATOR VAGINAL TAPE INSIDE OUT (TVT-O) FOR THE TREATMENT OF FEMALE CANINE URINARY INCONTINENCE: PRELIMINARY RESULTS. Claeys S.*, de Leval J.#, Ruel H., Heimann M., Hamide A.* School of Veterinary Medicine and School of Medicine, #University of Liège, Belgium.

Objectives: 1) to evaluate the feasibility of the TVT-O in bitches and to report the results of canine cadaver dissections performed to determine the anatomical trajectory of the tape. 2) to evaluate the urodynamic and morphological effects of TVT-O in continent and incontinent bitches.

Materials and Methods: 1) TVT-O tape was inserted in 12 female canine cadavers. Anatomical dissection was then performed and distances between the tape and neighboring anatomical structures were recorded. 2) TVT-O tape was inserted in 2 continent spayed female beagle dogs. Urethral pressure profilometry (UPP) and a vaginourethrogram were performed preoperatively, immediately after surgery and at 2, 4 and 6 months postoperatively. The 2 dogs were euthanized 7 months after surgery and histologic examination of the tissues surrounding the tape was performed. TVT-O was then used to treat 2 spayed female dogs with urethral sphincter mechanism incompetence (USMI).

Results: 1) TVT-O tape was consistently located in a strictly perineal space so that injury to the urinary bladder is not to be expected. The tape was also consistently located at a safe distance from major neurovascular structures including the femoral vessels and the obturator nerve. 2) No complications were observed during surgery or postoperatively in the 4 dogs. Postoperative UPP showed an increased integrated pressure (IP) in the 2 beagle dogs postoperatively, at 2 and 4 months. Histology showed a slight fibrocollagenic and lymphoplasmocytic reaction. The incontinent bitches were continent after surgery. IP was increased 1 month after surgery in the first incontinent bitch.

Conclusion: 1) TVT-O can be adapted to dogs and is reproducible and safe. This technique minimizes the potential for bladder, urethral, vascular, or neurological complications. 2) No complications were observed after insertion of the TVT-O in 4 dogs. The increased IP observed during UPP reflects an increased urethral resistance which should be beneficial in bitches with USMI. The good result observed in 2 incontinent dogs is encouraging.

TRANSORAL SUTURE FOR MANAGEMENT OF MANDIBULAR FRACTURE/LUXATION IN THE CAT. Delisser PJ, Störk CK*, Rayward RM, Thomson DG, Whitelock RG*. Davies Veterinary Specialists, Gobion, Hitchin, UK.

Introduction: We report the use of a transoral suture (TOS) along with its indications, complications and results in a series of feline patients suffering from a combination of mandibular/maxillary fractures and temporomandibular joint (TMJ) fracture/luxation.

Materials and Methods: The TOS was placed circumferentially subcutaneously around the mandibles and the maxilla at the level of the 3rd premolar tooth using a heavy gauge non-absorbable suture with a large, semicircular, swaged-on cutting needle. Exiting the suture over the bridge of the nose facilitates TOS placement. A small spacer was used between the incisors before the suture was pulled tight and secured with a knot ventrally. All cats treated at our clinic between January 2003 and November 2007 with the aid of a TOS were evaluated. The pertinent data was extracted from the patients' files, and the referring veterinarian's medical history. A detailed specific long-term follow-up owner questionnaire was conducted.

Results: Twenty cats fulfilled the inclusion criteria. The best indications for the use of a TOS were found to be unstable TMJ fracture/luxations or mandibular fractures caudal to the applied suture. In patients with additional rostral injuries the TOS was usually employed in combination with other stabilisation methods such as symphyseal cerclage wires and/or ESF. The suture was left in place for a median duration of 19 days (range 2–36 d; mean 17.4 d). Owner assessed long-term follow-up was obtained in 17/20 patients. The functional and cosmetic result was found to be good or excellent in 16/17 patients. Complications were rare and included TOS loosening and acute suture release for vomiting/regurgitation or potentially for respiratory distress in the early post-operative period.

Discussion/Conclusion: The TOS was found to be an easy, quick, economical, minimally invasive, yet very effective technique for treatment of oral trauma. Care should be exercised in patients presenting with severe pharyngeal swelling and dyspnoea. Contraindications are the inability to provide continuous post-operative monitoring or to place, maintain or tolerate a feeding tube. The minimal necessary treatment period warrants further study.

INTERCOSTAL IMPLANTATION OF VERESS NEEDLE IN CANINE LAPAROSCOPIC PROCEDURES – A COMPUTED TOMOGRAPHY AND CADAVER STUDY. Dörner, J, Dupré, G*, Kneissl, S. University of Veterinary Medicine, Vienna, Austria.

Introduction: Creation of a pneumoperitoneum is considered one of the most critical steps during laparoscopic surgery. Intercostal implantation of

the Verres Needle (VN) has been tested in people but not in dogs. The aim of this study was to evaluate the feasibility and complication rates associated with intercostal intra-abdominal implantation of the VN. The hypothesis was that computed tomography (CT) would confirm the existence of a free hypochondriac wall (FHW) region and that an optimal site for intercostal insertion of the VN into the abdomen would be found.

Materials and Methods: In order to find where abdominal organs were not in contact with the abdominal wall CT scans were performed in 4 dogs. After the CT study, 6 different intercostal locations were tested in 15 canine cadavers of different breed, sex and size. A laparoscopic examination was then made to evaluate punctures of any intra-abdominal structure.

Results: CT scans allowed definition of the intra-abdominal part of the hypochondriac region and identified areas with, and without, contacting abdominal organs of dogs in dorsal recumbency. In these samples, the ventral aspect of the 10th intercostal space (ICS) and the left 9th ICS were consistently out of contact with abdominal organs. In the cadavers the right 9th ICS was found to carry the least risk. A statistically significant difference was found when comparing the 8th right and the 9th right ICS ($p=0.02$). A significant correlation ($p < 0.01$) was found between the body weight and the distance table-xiphoid.

Conclusion and Clinical Relevance: The results of the study suggest, that intercostal insertion of the VN into the abdomen is feasible. The position with the least risk of puncturing any underlying organ or creating a pneumothorax is the right 9th ICS. Further clinical studies on live patients are needed to test the results obtained on cadavers.

MINIMALLY INVASIVE PERCUTANEOUS PLATE-ROD OSTEOSYNTHESIS FOR TREATMENT OF EXTRA-ARTICULAR HUMERAL FRACTURES IN DOGS. Guiot LP, Déjardim LM*. Michigan State University, East Lansing, MI, USA.

Introduction: Canine humeral fractures are challenging in part due to the complex bone anatomy and surrounding neurovascular bundles. Furthermore, most fractures involve the distal third of the humerus, which limits bone stock available for implant anchorage. Techniques using open reduction and internal fixation (ORIF) have been associated with a complication rate of up to 38%, presumably because of extensive soft tissue dissection, which may jeopardize bone healing. In an effort to improve clinical outcome, we developed a new technique based on closed reduction and internal fixation under fluoroscopic guidance.

Surgical Technique: Fracture reduction was achieved using an intramedullary rod inserted in a normograde fashion through a remote incision distal to the medial epicondyle. A plate was then inserted percutaneously along the medial humeral cortex in the epiperiosteal plane through the same epicondylar skin incision. To visualize the proximal aspect of the plate, a second key hole incision was made cranial and distal to the greater tubercle. Finally, the plate was secured to the bone in a bridging mode, using 2–3 proximal and distal screws prior to skin closure.

Clinical Outcome: This technique was applied to 6 dogs (age: 5–35 months) of various sizes (BW: 7–32 kg), presenting with simple to comminuted fractures with or without fissures involving the mid-diaphyseal and distal metaphyseal region. The plate span ratio (PSR) was 2.4 ± 0.37 and the plate screw density (PSD) was 0.38 ± 0.112 (mean \pm SD). The mean healing time to clinical union was 38 days (range: 34–43 days). All dogs healed without complications.

Discussion/Conclusion: The healing time reported in this case series is shorter than that previously documented with ORIF (range 53–140 days). This may be explained by close adherence to established biological osteosynthesis principles. Our minimally invasive approach and percutaneous implants insertion optimizes preservation of the fracture hematoma, which has been shown to enhance bone healing. In addition the PSR and the PSD used in this series have been shown to provide a mechanical environment conducive to bone healing. This clinical report suggests that minimally invasive percutaneous plate-rod osteosynthesis is a valid approach for the treatment of a variety of humeral fracture configurations.

IN VITRO BIOMECHANICAL EVALUATION OF THE CANINE CRCL DEFICIENT STIFLE AFTER TTA WITH VARYING ANGLES OF STIFLE JOINT FLEXION AND AXIAL LOADS. DR Hoffmann¹, MP Kowaleski^{2*}, KA Johnson^{1*}, RB Evans³, RJ Boudrieau^{2*}. ¹The Ohio State University, College of Veterinary Medicine, Columbus, OH, USA, ²Tufts University Cummings School of Veterinary Medicine, N. Grafton, MA, USA, ³University of Illinois, College of Veterinary Medicine, Urbana, IL, USA.

Introduction: Neutralization of cranial tibial thrust (CrTT) by TTA, effect of stifle angle and applied load, and patellar tendon angle (PTA) at the neutral point measured by the TPA method (PTA^{TPA}) and the common tangent method (PTA^{CT}) have not been determined. Our hypotheses were that after TTA CrTT, retropatellar pressure (RPP) and patellar tendon force

(PTF) would decrease, PTA^{TPA} and PTA^{CT} would be $\sim 90^\circ$, and that PTA^{TPA} > PTA^{CT} at various stifle angles and applied loads.

Materials & Methods: Thirty cadaveric hind limbs were prepared and tested as described by Apelt et al; additionally, a medial hemi-menisectomy was performed, and the tibia was constrained caudally by a cable and load cell, preventing CTS (direct measure of CrTT). Load cells also determined RPP and PTF. Stifle angle and body weight load applied (bw) varied by group: group 1) 135°/30% bw, group 2) 145°/30% bw, and group 3) 135°/50% bw. The tibial tuberosity was advanced, recording all load cell data until CrTT was neutralized, a lateral radiographic image was obtained, and PTA^{TPA} and PTA^{CT} were measured.

Results: Changes in the stifle joint angle or load applied did not affect the PTF or CrTT after CrCL transection. Changes in the stifle joint angle or load applied after TTA also did not change the PTF or CrTT. Advancing the tibial tuberosity was shown to decrease CrTT, RPP and PTF. PTA^{TPA} > PTA^{CT} in groups 1 and 2. PTA^{TPA} = PTA^{CT} in group 3. PTA^{TPA} and PTA^{CT} did not differ from the theoretical value of 90° in group 1 and PTA^{CT} did not differ in group 2, however PTA^{TPA} was > 90° in group 2, and both PTA^{TPA} and PTA^{CT} were < 90° in group 3.

Discussion: Our hypotheses were supported. Reduction of CrTT with stabilization of the CrCL deficient stifle joint after TTA is achieved through alteration in the direction of the quadriceps force. PTA^{TPA} > PTA^{CT} at a stifle angle of 135°, PTA^{TPA} varies more with stifle angle than PTA^{CT}. PTA^{CT} is recommended for preoperative planning of TTA. Target PTA values of < 90° may be required; however, muscular co-contraction was not considered.

FOURIER ANALYSIS OF VERTICAL GROUND REACTION FORCES IN DOGS WITH UNILATERAL HIND LIMB LAMENESS CAUSED BY DEGENERATIVE DISEASE OF THE HIP JOINT AND IN DOGS WITHOUT LAMENESS. Katic N., Bockstahler B., Mueller M., Peham C. Department of Small Animals and Horses, University of Veterinary Medicine, Vienna, Austria.

Objective: To evaluate Fourier analysis for assessment of ground reaction forces (GRFs) and its ability to detect subtle changes of the shape of the force-time curves of GRFs.

Study Design: Retrospective study.

Animals: 37 dogs with or without unilateral degenerative disease of the hip joint (DJD-H)

Methods: Data were obtained from other studies and analyzed retrospectively. Among the 37 dogs, 20 had unilateral DJD-H and 9 (non-Belgian Malinois breeds) had no lameness; another 8 were non lame Belgian Malinois (radiographically confirmed Fédération Cinologique International classification A). Gait data acquisition was performed as dogs walked on a treadmill with integrated force platforms. The peak vertical force, mean vertical force, and vertical impulse were compared among the 3 groups. Fourier analysis was performed on the force-time curves for the vertical GRF and calculated Fourier coefficients were compared within and between groups.

Results: Lameness in the hind limbs with DJD-H was detectable via conventional analysis of the GRF as well as via Fourier analysis. However, subtle gait aberrations in the forelimbs of the dogs with DJD-H were detected solely by Fourier analysis of GRFs and were not apparent after conventional analysis.

Conclusions and Clinical Relevance: Results support the applicability of Fourier analysis for evaluation of force-time curves of GRFs. Fourier analysis can reveal subtle alterations of gait that might otherwise remain inapparent; however, further investigation is necessary before this method can be routinely applied for lameness detection in dogs.

SPATIAL, TEMPORAL AND KINETIC EVALUATION OF NORMAL CATS AT WALK, USING A PRESSURE WALKWAY. Le Quang T., Maitre P., Colin A., Viguier E.* Small Animal Department, Ecole Vétérinaire, Université de Lyon, France.

Introduction: There has been less study of cat locomotion than horses and dogs and data relating to cats remains limited and controversial.

The purpose of this study was to measure and evaluate spatio-temporal parameters and the pressure data of the gait of normal cats at walk.

Materials and Methods: Eleven clinically healthy cats from one to six years of age of various breeds (4.7 ± 0.16 kg) owned by staff of the National Veterinary School of Lyon were recruited for gait analysis. A 2.4m long walkway was used to collect spatio-temporal and pressure data simultaneously, for each four paws on consecutive strides. Data include: stride time, stance time, stance time, stride length, peak pressure, mean pressure, mean number of sensors activated by each paw and walking velocity. Symmetry and stance distribution were also estimated.

Results: All paws were easily and efficiently analyzed. The velocity average is 0.68 ± 0.1 m/s. The ratio forelimbs/hindlimbs of the number of

sensors is approximately one. This ratio for relative stance time is 1.05 ± 0.02 ; the cats use the forelimbs slightly longer than the hindlimbs during stance phase. For the peak pressure, it is 1.16. 53.7% of the pressure was recorded on the thoracic limbs at the walk.

Discussion/Conclusions: This system enabled measurement of the temporal parameters and pressure data of the cat at a walk. Preliminary results confirmed that the cat walk is a symmetric gait. Stance distribution appeared to be more pronounced on forelimbs although this asymmetry is less marked than in dogs and horses.

LIMB SPARING SURGERY FOR DISTAL ULNAR OSTEOSARCOMA: ULNECTOMY AND PANCARPAL ARTHRODESIS – A REPORT OF 5 CASES. Massari F, Romanelli G*. Clinica Veterinaria Nerviano, Nerviano, Italy.

Introduction: The correct management of ulnar osteosarcoma, apart from amputation, is unknown due to the paucity of cases reported in the literature and no particular attention is paid to complications found in removing the ulnar styloid. The aim of this study was to evaluate peri and post-operative complications and life style of patients treated for distal ulnar osteosarcoma by partial ulnectomy plus pancarpal arthrodesis.

Materials and Method: Five dogs with a histologically confirmed distal ulnar osteosarcoma. Patients were aseptically prepared and the tumor excised with an oscillating saw claiming a 3–5 cm margin of the tumor proximally and extending distally to the level of the antebrachio-carpal joint. When radius involvement was diagnosed, a perpendicular cortical radial osteotomy was made. The forearm was stabilized using a 3,5 mm DCP plate positioned and a rigid bandage was applied for 45 days.

Results: All patients were in T₂N₀M₀ stage. Tumors ranged between 29,4 and 39% of bone length with no involvement of adjacent soft tissues. In two cases the radius was macroscopically involved on medial cortex. The percentage of ulna resected ranged between 53,7 and 69,8 % of its length with concurrent perpendicular medial cortical radial osteotomy (18,7 and 60 % of radius length) in two patients. The plate length ranged between 12 holes in 4 dogs and 18 holes in one. All tumors were resected with clean histological margins and radiographic margins between 20,7 and 34,5 % of ulnar length. An adjuvant chemotherapeutic protocol was used in 4 dogs. All dogs used the limb the day after surgery and no postoperative complications were noticed. The plate was removed in one dog 548 days after surgery because of chronic infection. Neoplastic local relapse occurred in one dog. Survival ranged between 80 to 1860 days (mean 568, median 200).

Discussion: Partial ulnectomy and pancarpal arthrodesis allowed immediate pain free, weight bearing with good function and consequent owner satisfaction though considering the small number of patients treated. The single relapse occurred in the only patient in which an adjuvant chemotherapy was not administered. The choice of this surgical technique was satisfactory in the management of the radiocarpal instability resulting from the removal of the ulnar styloid.

HALF SEMITENDINOSUS MUSCLE TRANSPOSITION TECHNIQUE TO REPAIR VENTRAL PERINEAL HERNIAS IN DOGS. Morello E, Martano M, Nicoli St, Bussadori R¹, Buracco P*. Veterinary School of Turin¹ Private practice, Milan, Italy.

Introduction: The use of a semitendinosus muscle flap has been reported to be useful in cases of ventral perineal hernia. The purpose of the study is to present a modification of the semitendinosus muscle flap technique for the repair of ventral perineal hernias in small size dogs.

Material and Methods: Medical records of dogs with lateral and ventral perineal hernia treated with a modified semitendinosus muscle flap were reviewed. The muscle was transposed to fill the pelvic defect on the opposite side. The modified technique consisted in longitudinally splitting the muscle in two parts, with the lateral half of the muscle remaining in its anatomic position. Colo- and vas deferens pexy were performed. Intact male dogs were castrated. Wound complications, limb function and outcome were assessed by physical and rectal examinations and by phone interview.

Results: Four dogs were treated. Mean age and weight were 9.2 years and 8.2 kg, respectively. The disease was unilateral and bilateral in 3 and 1 dogs, respectively. The right or left split semitendinosus muscle was transposed in 2 cases each. In 1 case the modified technique was combined to internal obturator muscle flap. Colo- and vas deferens pexy were performed in 3 dogs. The mean follow up time was 301.5 days. Wound complications and lameness were not observed; no recurrence of perineal hernia was detected. An improvement of quality of life was noted despite of persistence of intermittent tenesmus in 2 cases.

Discussion: In this series muscle size represented a problem in small size dogs because of its thickness and width. To address this problem, the muscle was longitudinally divided in two parts. The results reported showed that half of the semitendinosus muscle can be safely transposed to repair ventral

perineal defects. On postoperative rectal examinations a good lateral and ventral muscular rectum support was appreciated, even stronger when the semitendinosus transposition was combined on the same side to the internal obturator muscle flap. Few postoperative complications were reported and perineal hernia did not recur.

Small Animal Resident Presentation

LONG-TERM CLINICAL OUTCOME OF SURGICAL TREATMENT FOR IDIOPATHIC CHYLOTHORAX IN 10 DOGS. C. Adrega da Silva¹, E. Monnet^{*2}, JF Bardet^{*3}. ^{1,3}Clinique Vétérinaire Dr Bardet, Neuilly-sur-Seine, France; ²Colorado State University, Fort Collins, CO, USA.

Objective: To evaluate long term clinical outcome of thoracic duct ligation (TDL), subtotal pericardectomy (SP), and thoracic omentalization (TO) performed in 10 dogs with idiopathic chylothorax approached by median sternotomy.

Materials and Methods: A retrospective study of 10 dogs with idiopathic chylothorax undergoing surgical treatment between November 1995 and June 2008 at Colorado State University-Veterinary Teaching Hospital (CSU-VTH) was conducted. All cases having undergone median sternotomy approach during this period were selected. Dogs with less than 4 month follow-up after surgery and animals in which an underlying disease of chylothorax could be identified were excluded from this study. Dogs were considered free of disease if thoracic drainage was not necessary for a minimum of 4 weeks, postoperatively. Statistical significance was indicated when $P < 0.05$.

Results: Ten dogs underwent surgery for treatment of chylothorax. The pleural fluid had high level of triglycerides, which ranged from 470 to 2649 mg/dl (mean, 1208.4 ± 758.2 mg/dl) compared to the respective serum triglycerides. Right middle lung lobectomy was performed in 5 dogs (50%). Postoperative early major complications occurred in 3 (30%) dogs. Hospitalization time ranged from 3 to 14 days (mean, 5.9 ± 3.1 days). The follow-up intervals in this study ranged from 5 to 104 months (mean, 42.4 ± 30.7 months). Complete resolution of clinical signs at long-term follow-up and excellent outcome were recorded in all dogs.

Discussion/Conclusion: Median sternotomy can be used as the surgical approach for chylothorax. A treatment combination of TDL/SP/TO was associated with a complete resolution of clinical signs in dogs with idiopathic chylothorax. Long term duration of chylous pleural effusion condition without surgical treatment can predispose to lung consolidation and torsion.

LATERAL THORACIC ARTERY AXIAL PATTERN FLAP IN CATS. H. Benzioni, R. Shahar*, S. Yudelevich*, A. Shipov, J. Milgram*. The Hebrew University of Jerusalem, Israel.

Introduction: The objectives of this study were to describe the location of the lateral thoracic artery (LTA) in the cat, define the dimensions of an axial pattern flap based on this artery, and to report use of this flap in 2 clinical cases.

Methods: Eight cat cadavers and 2 cats with thoracic limb skin defect were used for the study. A dissection of the LTA was performed on 1 side of each cadaver. Injection studies were performed on the contralateral side. In 4 specimens, the LTA was cannulated and injected with positive contrast material. The flap was then raised and radiographed. In 4 specimens, the flap was injected with methylene blue. Adequacy of flap injection was subjectively evaluated and leakage of methylene blue from the cut edge was noted.

Results: The cutaneous location of the LTA caudal to the triceps muscle was confirmed. The LTA becomes superficial caudal to the triceps muscle and adjacent to the dorsal border of the deep pectoral muscle. This point was defined as the center of the flap in the dorsoventral direction. The ventral border of the flap was defined as the ventral midline. The dorsal border of the flap was defined as a line parallel to the ventral border at a distance equal to the distance from the center of the flap to the ventral border. The caudal border coincided with the last rib and the cranial border was defined as being adjacent to the caudal border of the triceps muscle. Mean flap size was $8.7 \text{ cm} \times 15.5 \text{ cm}$ for a mature, averaged-sized cat. Perfusion of the entire flap was demonstrated and flap viability was confirmed in 2 clinical cases.

Conclusion: The LTA flap is a useful flap for the repair of skin defects of the brachium and antebrachium in cats.

THE EFFECT OF TIBIAL TUBEROSITY ADVANCEMENT AND QUADRICEPS MUSCLE FORCE ON INSTABILITY OF THE CRANIAL CRUCIATE DEFICIENT STIFLE JOINT IN DOGS. AN *IN VITRO* STUDY. L Cohen, I Galante, R Shahar*, J Milgram*. Koret School of Veterinary Medicine, The Hebrew University of Jerusalem, Israel.

Introduction: The aims of this study were to evaluate both the effect of cranial transposition of the tibial crest and the effect of various quadriceps

loads on the cranial cruciate deficient stifle at three different tibiofemoral angles.

Material and Methods: Six canine cadaveric hind limbs from 6 adult dogs, with no radiographic sign of degenerative joint disease were used. The femur was stripped of soft tissue leaving the periarticular tissues and all the tissues of the crus and pes intact. Specimens were placed into a custom built joint testing machine and a single motion tracking sensor (NOB) was rigidly fixed to the tibia. A range of weights between 0.5 kg–5.0 kg were used to simulate the ground reaction force. Quadriceps loads of 0 kg, 5 kg and 10 kg were used. All specimens were tested at tibiofemoral joint angles of 105°, 120° and 135°. The joints were tested with the CrCL intact, after transection of the CrCL and after performing a TTA with cages of 6 mm and 9 mm.

Results: The cranial tibial translation in the ligament cut specimens was significantly larger than in the ligament intact specimens. A significant difference in cranial translation between the intact and TTA 6 mm specimens was found, however, there was no significant difference between the cranial translation in the intact specimens and the TTA 9 mm specimens. No interactions between: group × position or group × position × quadriceps were observed.

Discussion: Cranial translation with the CrCL cut was significantly larger when compared with the CrCL intact. A decrease in cranial drawer sign was noted after performing a TTA with no quadriceps load, this may suggest that some degree of passive stability may be conferred to the stifle joint simply by performing the procedure. This effect was seen in only one of the positions tested. At higher quadriceps loads, both TTA 6 mm and TTA 9 mm effectively eliminated cranial translation at the lower range of ground reaction forces. Although not significant, both procedures were better able to prevent translation at higher quadriceps loads and larger flexion angles.

LAPAROSCOPIC OVARIECTOMY IN DOG: COMPARISON BETWEEN SINGLE-HOLE AND TWO-HOLE APPROACHES. V. Fiorbianco¹, G. Dupré^{*1}, M. Skalicky¹, N. Gültiken², S.S. Ay², M. Findik². ¹University of Veterinary Medicine Vienna, Austria. ²Ondokuz Mayıs University, Samsun, Turkey.

Introduction: The aim of this study was to compare the time and complication rate of single-hole and two-hole approaches to perform laparoscopic ovariectomy in healthy dogs and to evaluate the learning curve of these techniques for non-laparoscopic trained surgeons.

Materials and Methods: Forty-two strayed dogs were enrolled in the study and randomly assigned in two groups. In single-hole approach group, an operative laparoscope with working channel was used and, in two-hole approach group, two 5 mm cannulas were used to accommodate the laparoscope and instruments. In both groups the ovariectomy was performed using a bipolar sealer/divider device. Dogs characteristics, surgical times, and perioperative complication rates were compared in the two study groups. The duration of right ovariectomy was evaluated to define the learning curve of two non-trained surgeons.

Results: There were no significant differences in any of the dogs characteristics and in all but 2 (abdominal exploration and right ovary resection) surgical duration times in the two groups. The mean surgical duration was 17 minutes and 57 seconds in the single-hole group and 16 minutes and 6 seconds in the two-hole group. Factors that significantly affected surgical times included body condition scores, the amount of fat in the ovarian ligament, and the surgeon's expertise. No major complications occurred. No reduction in surgical time related to the surgeon's learning curve was evident for resection of the right ovary.

Discussion/Conclusion: Single-hole laparoscopic ovariectomy is feasible, safe and does not increase the surgical duration time in comparison with two-holes approach. In this study a learning curve could not be assessed for non-trained surgeons. The single-hole approach is a valid alternative to conventional laparoscopic ovariectomy in bitches. It can help to minimize soft-tissue trauma and to improve cosmetic appearance.

COMPLICATIONS AND RECURRENCE RATES AFTER INTERNAL OBTURATOR MUSCLE TRANSPOSITION WITH OR WITHOUT LAPAROTOMY FOR TREATMENT OF PERINEAL HERNIA IN DOGS: 36 CASES (2002–2007). J.G. Grand, S. Bureau*. Clinique vétérinaire Alliance, Bordeaux, France.

Objective: To report and compare clinical outcome, complications and recurrence rates after surgical treatment of Perineal Hernia (PH) by Internal Obturator Muscle Transposition (IOMT) or Laparotomy with colopexy/cystopexy followed by Internal Obturator Muscle Transposition (LAP-IOMT).

Study Design: Retrospective study.

Sample Population: Thirty six dogs with PH.

Methods: Medical records of dogs treated surgically for PH by IOMT (Group I, January 2002–November 2004) or LAP-IOMT (Group II, December 2004–November 2007) were reviewed. Long term follow-up was obtained by telephone interview of owners. Variables were compared with a Fisher's exact test for categorical data and ANOVA one-way analysis for continuous data. P values of <0,05 and <0,1 respectively were considered significant.

Results: Mean follow-up time was 29,52 months (median = 35,5 months, range = 9–66 months). The long-term follow-up was significantly higher for the group I (41,89 ± 1,99 months; range, 36–66 months) than for the group II (17,17 ± 2,05 months; range, 9–35 months) (p < 0,0001). There were no statistically significant differences in the age, the weight, the duration of clinical signs and the incidence of pre-operative tenesmus before surgery between the two groups. Clinical outcome, complications and recurrence rates were not significantly different between IOMT and LAP-IOMT groups. Overall, results were good to excellent in 86,1% of cases. Wound complications (dehiscence, infection) occurred in 4 dogs (11,1%). Post-operative tenesmus was observed in 7 cases (19,4%). Recurrence of PH occurred in 4 dogs (11,1%) and was strongly associated to the presence of post-operative tenesmus (p = 0,01).

Conclusions: The use of laparotomy with colopexy/cystopexy as a preliminary procedure prior to IOMT for surgical treatment of PH is not associated with a significantly lower rate of complication and recurrence.

Clinical Relevance: IOMT is nevertheless subjectively easier to perform after laparotomy.

LASER-DOPPLER MEASUREMENTS OF SPINAL CORD BLOOD FLOW DURING DISC STAPLED VERSUS HAND-SEWN METHODS FOR SMALL BOWEL ANASTOMOSIS IN DOGS: RESULTS OF A PROSPECTIVE RANDOMIZED STUDY. N. Jardel¹, D. Leperlier¹, M. Manassero, P. Fayolle, P. Moissonnier^{1*}, E. Riquois², V. Viateau¹. ¹École Nationale Vétérinaire d'Alfort, Maisons-Alfort, France; ²Laboratoire Vétérinaire, Lures, France.

Objectives: To evaluate and compare anastomotic leak rates between hand-sewn and stapled intestinal anastomoses in dogs suffering from various intestinal disease and operated by non-expert surgeons.

Study Design: Prospective randomized clinical study.

Materials and Methods: Dogs admitted between July 2003 and June 2008 for a condition requiring an enterectomy were randomly divided in two groups: (i) hand-sewn anastomosis (HSA, group 1); (ii) one stage side-to-side functional end to end intestinal anastomose and resection with stapling devices (OSFEAR, group 2). All procedures were performed under the supervision of a senior surgeon, by non-expert surgeons who had received prior training with both techniques in a non survival laboratory workshop in pigs. The working hypothesis was that in the hand of non-expert surgeons, the stapling technique would be associated with lower rates of intestinal leakage (IL) and subsequent morbidity compared to the hand-sewn technique.

Results: 53 dogs were enrolled in the study. Age, weight, mean duration of clinical signs before referral, mean ASA scores, albumin dosages, surgical indications and incidence of pre-operative peritonitis were similar between groups. Conditions requiring an enterectomy included: foreign body (n = 29), intussusception (n = 10), tumor (n = 9), ulcer (n = 1) and occlusion occurring after previous surgical intra-abdominal procedure (n = 4). IL rates did not differ significantly between groups. However, there was a trend towards higher occurrence of IL in group 1 compared with group 2 (4/24 and 1/29 of cases, respectively).

Discussion-Conclusion: In the present study, OSFEAR proved to be a safe technique in the hand of non-expert surgeons. The 3% rate of IL in dogs treated with OSFEAR compared favourably with the 17% rate documented with HAS and is similar to the results obtained with stapled side-to-side open lumina technique in 2 former studies in dogs.

Clinical Relevance: When financial constraints are not a concern, a stapled anastomosis technique is a safe alternative surgical strategy in the hand of non-expert surgeons.

ANATOMICAL STUDY OF NORMAL STIFLES IN DOGS USING LOW-FIELD MRI AND MRI ARTHROGRAPHY. E. Pujol, L. Cauzinille, C. Poncet*, H. Van Bree*, B. Bouvy*. Centre Hospitalier Vétérinaire Frégis, Arcueil, France and Department of Medical Imaging, University of Ghent.

Description of the normal MR anatomy of the canine stifle is a prerequisite to become able to investigate stifle derangements. The objectives of our study were: -To develop a stifle MR imaging protocol of normal dogs using low-field magnet. -To describe anatomy of the stifle in normal dogs using low-field MRI and to compare it with gross dissection in cadaveric limbs. -To compare conventional MR and MR arthrography images of normal dogs stifle.

Materials and Methods: Thirteen adult canine hindlimbs were studied from nine dogs euthanized for reasons unrelated to disease of the stifle. Limbs 1 to 7 were used to develop the MR imaging and MR arthrography protocol. Three images sequences were obtained: a T1-weighted spin echo (T1-SE) sequence in sagittal, dorsal and transverse plane; a T2-weighted spin echo (T2-SE) sequence in sagittal and dorsal plane; a T1 gradient echo (T1-GE) sequence in sagittal plane. Following the precontrast sequences, a solution of diluted gadolinium was injected into the joint until distension of the articular capsule and the postcontrast images were acquired, the same sequences were realized excepting T2-weighted SE sequence. Joints 8–13 were evaluated with MR, MR arthrography and gross dissection. The structures observed by gross dissection were verified by comparison with MR images to assess the efficacy of our technique.

Results: Good quality images were obtained in all dogs. The extra-articular structures were clearly visible in each stifle in all sequences, soft tissue structures around the joint were clearly better seen with gradient echo images. Cranial and caudal cruciate ligaments were visualized as low signal intensity structures in all sequences. Medial and lateral menisci of all dogs were visualized as wedge shaped areas of low signal intensity in dorsal and sagittal plane. Collateral ligaments, meniscofemoral ligament were seen as low signal bands on dorsal sequences in all dogs. All these structures were compared to gross dissection in all dogs. MR arthrography in all stifles permitted to observe more clearly structures like joint capsule; cranial and caudal cruciate ligaments were better evaluated than conventional MRI in all but one dog. Image quality of the menisci was similar for both studies.

Conclusion: Visualization of extra-articular structures, ligaments, subchondral bone, tendons and menisci was ensured with our technique and images obtained correlated well with gross dissection. Menisci were well visualized in all dogs. The protocol used with a low-field unit offers reliable information of anatomic structures in normal dogs.

INVERSE DYNAMICS ANALYSIS OF THE STIFLE JOINT IN LABRADOR RETRIEVERS WITH AND WITHOUT CRANIAL CRUCIATE LIGAMENT DEFICIENCY. C.A. Ragetly, D. J. Griffon*, J. E. Thomas, E. T. Hsiao-Weksler. University of Illinois, Urbana, IL.

Inverse dynamics analyses combine kinematics, morphometric and ground reaction force data in a segmental model of the limb, and have greatly contributed to the understanding of normal and pathological movement in humans. The objectives of this study were to (1) characterize net joint moments, powers and joint reaction forces (JRF) across the stifle joints in Labrador Retrievers with and without cranial cruciate ligament (CCL) disease, and (2) investigate differences in joint mechanics between normal, CCL-deficient and contralateral hind limbs. The inertial properties were determined using 3-dimension computerized tomography in 14 normal dogs and 9 dogs with unilateral CCL-deficiency. Thirteen spherical skin markers identified bilateral thigh, crus and foot segments. Kinematic data of trotting dogs were collected using a 6-camera motion capture system synchronized with a force plate. An inverse dynamic approach was used to compute, in the sagittal plane, stifle net moment, power and JRF during the stance and swing phases. Mann-Whitney and Wilcoxon tests were used to compare data between normal, diseased and contralateral limbs. Moment, power and JRF patterns were similar in shape, but amplitudes were larger for contralateral limbs compared to normal limbs, and for normal compared to affected limbs. The amplitude of peak power generation in late stance in contralateral limbs was about 3 times that measured in normal limbs and 18 times greater than that of CCL-deficient limbs. This study documents for the first time net moment, power and JRF around the stifle joint in Labrador Retrievers with a without CCL deficiency. Reductions in stifle moment and power peaks and in stifle JRF peaks and impulses were interpreted as modifications adopted to reduce or avoid painful mobilization of the injured joint. Kinetics data is consistent with an increased activity of the contralateral side, which may be compensatory but may also contribute to the predisposition of contralateral limbs to CCL deficiency.

IN VITRO DETERMINATION OF A SECURE ABERDEEN KNOT IN PLASMA AND FAT. Schaaf O.R.¹, Glyde M.R.*¹, Day R.², Murdoch University Vet Hospital, Murdoch, Australia, ²Royal Perth Hospital, Biomaterials and Implant Technology Unit, Perth, Australia.

Introduction: This paper describes a novel way of testing knot security in a "fatty environment". We determined the minimum number of throws needed to form a secure knot of three different knot types in plasma and in fat. Knot types tested were a square knot as tied at the start of a continuous pattern (square start), a square knot as tied at the end of a continuous pattern using the penultimate loop (square end) and an Aberdeen knot.

Materials and Methods: All knots were tied by one surgeon using USP 2/0 polydioxanone around a 12.5mm bar. Knots were tensioned until failure in an Instron 5560 at 50 mm/min.

Prior to tying, the suture was coated in either canine plasma or canine liquid fat held at 38°C. The latter was prepared from canine falciiform ligament. A force of 19.6 N, measured with a digital force gauge; was placed on each throw of tested square knots. Throws of tested Aberdeen knots were loosely snugged on one another and the final locking throw (turn) pulled to 19.6 N. Ears were cut to 3 mm. Two modes of failure were possible: either the suture unravelled or the load continued until the knot broke. A secure knot was defined as a knot configuration that did not unravel in 20 knots tested consecutively but failed by breakage.

Results: Total minimum throws placed to obtain a secure knot in plasma/fat: Square start 4/5, Square end 5/5, Aberdeen 3 + 1/3 + 1. Relative knot security (RKS) of plasma / fat coated Aberdeen knots (78/79%) were significantly higher ($p < 0.05$) than plasma/fat coated square start (67/69%) and square end knots (61/60%).

Discussion: When tying a square start knot in a fatty environment such as linea alba closures in fat overweight dogs the surgeon should add an extra throw to make a secure knot. In the future other knot types should be evaluated with fat coated suture. The significantly higher RKS of the Aberdeen makes it a superior choice for high load closures such as body wall with monofilament sutures. The Aberdeen knot is an easy, less bulky alternative to the square knot that can consistently achieve a higher relative knot security when tied with a secure configuration in plasma or fat. It may be a better choice for starting or ending a continuous suture pattern of 2/0 PDS than a square knot.

ND:YAG SURGICAL LASER AND REMORGIDA BIPOLAR ELECTRO-SURGERY FORCEPS COMPLICATIONS OF KYON THR IN GROWING DOGS VS ADULT DOGS. Vezzoni L., Boiocchi S., Vezzoni A.* Clinica Veterinaria, Cremona, Italy.

Introduction: We evaluated the incidence of complications after Kyon Cementless THR performed in growing dogs at the age of 4.5 to 8.5 months versus the complications seen in older dogs that underwent THR in the same period of time.

Materials and Methods: Medical records of THRs performed from January 2002 to December 2007 were reviewed. Dogs were divided in 2 groups, up to 8.5 months of age and older dogs. In the two groups we evaluated the number and type of complications in relationship with the size of the implants used, the breed and the body weight.

Results: The group of growing dogs included 102 THRs, while the group of adult dogs included 388 THRs. In the group of growing dogs the age ranged from 4.5 to 8.5 months. In the group of adult dogs the age ranged from 9 months to 11 years. In growing dogs we had one or more complications in 16 cases (15.6%), of which 14 were successfully revised and 2 were explanted. In adult dogs we had 36 complications, 31 successfully revised and 5 explanted.

Discussion and Conclusions: We had more luxations (5.9%) and stem breakage (4.9%) in growing dogs than in adult dogs (3.6% of luxations and 0.8% of stem breakage). The complication rate of femoral fracture, cup loosening, stem loosening and infection were similar in both groups. Of the 6 luxations in growing dogs, 5 were Newfoundlands, a breed at higher risk of luxation. Excluding the Newfoundlands, the incidence of luxation in the remaining growing dogs (1.0%) was lower than in the group of adult dogs. The most significant difference ($P < 0.001$) in the complication rate between the two groups was the stem breakage, 4.9% in growing dogs vs 0.77% in adult dogs. When implanting a hip prosthesis in growing dogs one should aim to provide a life long survival of the prosthesis. The strength of the titanium implants are related to their size compared to the body weight and the physical activity of the dog. Using smaller implants in heavier dogs or in very active dogs could lead to premature metal failure. To limit the risk of metal failure, both for the stem and the cup, the size of the implants in the growing dog should be the same as it would be when adult.

Small Animal Posters

A COMPARATIVE STUDY OF SEEDING TECHNIQUES AND THREE-DIMENSIONAL MATRICES FOR MESENCHYMAL CELLS ATTACHMENT. D. J. Griffon*, J. P. Abulencia¹, G. R. Ragetly², L. P. Fredericks¹, S. Chaieb³. ¹Small Animal Clinic, ²Manhattan College, New York, USA ³University of Illinois, Urbana, USA.

Mesenchymal stem cells (MSC) offer significant potential as a cell source in osteochondral tissue engineering because of their multipotent ability. Our goal was to identify the parameters influencing the recruitment of MSCs on

four scaffolds relevant to osteochondral tissue engineering, in terms of chemical and structural characteristics of the scaffolds as well as seeding technique.

Bone marrow derived MSCs were loaded on four different scaffold materials (poly-glycolic acid, poly(lactic acid), calcium phosphate, and chitosan-hyaluronic acid) using four different seeding techniques (spinner flask, custom vacuum system combined with a perfused bioreactor or with an orbital shaker, and orbital shaker) Construct fluid retention, cell binding kinetics, cell viability in the medium, DNA quantification and scanning electron microscopy (SEM) were used to access the effects of the seeding technique and the scaffold type on MSC seeding.

Based on cell suspension kinetics and DNA data, the type of loading (i.e. direct or indirect) influences mainly the delivery of cells to their respective scaffolds, while the type of scaffold has a predominant effect on cellular proliferation after the initial adhesion event. These differences observed between scaffolds may be attributed to the increased diffusion time associated with larger imbibed fluid volumes. Based on SEM evaluation, MSC often appeared to aggregate into flat sheets occluding external pores of matrices. Taken together, these results provide insight into the design of future experiments using MSC to engineer functional tissue.

ADRENALECTOMY FOR TREATMENT OF A PHEOCHROMOCYTOMA BY CAVAL VEINECTOMY WITHOUT CONCURRENT NEPHRECTOMY IN A DOG: A CASE REPORT. P. Guillaumot, D. Héripret, B. Bouvy*, C. Poncet*. Centre Hospitalier Vétérinaire Frégis, Arcueil, France.

An 11-year-old female Labrador was diagnosed with right adrenal tumour suspected to be a pheochromocytoma, and had a history of recent acute renal failure. The tumour showed extensive vena cava invasion from the supra renal part of the vena cava to its intra hepatic entrance. During surgery, adhesions of the neoplastic tissues with the right kidney were dissected and the right kidney was preserved. Attempted tumour and thrombus removal via venotomy was unsuccessful due to the firm adherence of tumoral tissue to the walls of the vena cava. The vena cava was ligated en bloc caudal to the liver and cranial to the right renal vein. The neoplastic gland was then excised en bloc with the portion of invaded caudal vena cava. Hind limb oedema had developed pre-operatively and increased during the first post-operative days. The dog was sent back home 6 days after the operation without apparent clinical disorder; hind limb oedema had partly disappeared. Histology confirmed the clinical diagnosis of pheochromocytoma. Clinical rechecks performed at 2, 4 and 18 months post-surgery showed a healthy dog. Clinical monitoring and ultrasonographic examinations performed at 18 months after surgery were also normal. At 30 months after surgery, the dog was showing no sign of renal dysfunction, tumor metastasis or recurrence.

Surgical treatment of pheochromocytoma involves the excision of the neoplastic adrenal gland. The presence of a tumour and/or thrombus in the vena cava may require a venotomy for thrombus removal. In a recent study, thrombus removal with caval venotomy has not been associated with a decreased prognosis. In some cases, removal of the thrombus by venotomy may be impossible and en-bloc surgical removal of the affected portion of the vena cava has to be performed. This technique has been described in one clinical case, in association with ipsilateral nephrectomy. In our case, it seemed important to preserve both kidneys in the context of pre-operative renal insufficiency. Return to a functional venous return can be explained by development of collateral neovascularisation simultaneously to tumor thrombus, or increase of venous flow in pre-existing tracks (vertebral venous sinuses, azygos vein). Follow-up of the case presented here shows that ligature-excision of the vena cava may be successfully carried out without concurrent ipsilateral nephrectomy for vena cava invasive pheochromocytoma, and with good long-term prognosis.

SHORT-TERM SURVIVAL AND RISK FACTORS ASSOCIATED WITH SURGICAL MANAGEMENT OF ACUTE PANCREATITIS. P. Rivier¹, D. Twedt², E. Monnet^{2*}, J-F Bardet's¹. Emergency and Referral Clinic, Neuilly sur Seine, France, ²Colorado State University, Fort Collins, USA.

Objective: To determine outcome and short-term risk factors associated with death in dogs undergoing surgery for acute pancreatitis.

Study Design: Retrospective case series.

Animals: 25 dogs having surgery because of pancreatic disease.

Procedures: Data regarding sex, breed, body weight, age at surgery, survival time, concurrent disease, preoperative CBC and serum biochemical panel results, coagulation profiles, clinical signs at initial evaluation, pancreatitis severity score, abdominal radiographic and ultrasonographic results, surgical findings, bacteriological culture, antimicrobial susceptibility, histological results, postoperative complications, outcome (discharged alive

from the hospital, died in the postoperative period, or euthanated at surgery) and duration of hospitalisation were determined.

Results: Three dogs died and one was euthanated during surgery. One dog died and six were euthanated in the post-operative period. The remaining 14 cases were discharged from the hospital, and all dogs discharged from the hospital were alive one month post-operatively. The one-month mortality rate was 44% (11/25). At surgery, 68% (17) had a generalised acute pancreatitis and 32% (8) had a focal pancreatic abscess with no generalised involvement. The only risk factors identified for patient death prior to the one-month survival period included pancreatic abscess, hypotension during anesthesia, and administration of a plasma transfusion. Postoperative complications identified following surgery included vomiting, anorexia, anaemia, hypotension, disseminated intravascular coagulation DIC and icterus.

Conclusions and Clinical Relevance: The overall prognosis for dogs undergoing surgery for acute pancreatitis must be considered guarded, and the incidence of perioperative complications is high. The surgical outcome of dogs with diffuse acute pancreatitis was better than dogs with a focal pancreatic abscess. Specific guidelines for surgical intervention and post-operative management were not determined in this study.

TRIPLE PELVIC OSTEOTOMY: THE DIFFERENCE BETWEEN USING A SLOCUM TYPE PLATE OF 12° AND 20°: AN *IN VITRO* AND *IN VIVO* STUDY. Béosier YM, Janssens LA*, Daems R. Anubis Veterinary Clinic for Companion Animals, Antwerp, Belgium.

Introduction: Triple Pelvic Osteotomy (TPO) is an established treatment for hip dysplasia in immature dogs. We hypothesized that using a 20° plate might create over-rotation of the acetabulum which might lead to "excessive" femoral head coverage (FHC). We defined the angle of minimal but efficient rotation with the Slocum type TPO plate to be 12°.

Material and Methods: Nine dissected pelvis of dog cadavers without signs of hip dysplasia were used (in vivo study). Twelve different dogs with signs of hip dysplasia were operated on using a 12° Slocum type TPO plate (in vitro study). FHC was measured on ventrodorsal radiographs in both studies. A CT scan study measured the dorsal acetabular rim angle (DARA) in the in vitro study. A two-way repeated measures ANOVA model was used for statistical analysis. FHC was also calculated in 30 other dogs of comparable weight and age that underwent a 20° TPO to compare post surgical FHC with the 12° group.

Results: In vitro: median FHC increase (compared to pre-rotation of the acetabulum) was 6.1% and 12% in respectively the 12° and 20° TPO groups. The median DARA change was -4.8° and -6.5° in respectively 12° and 20° TPO groups. Change in FHC between 12° and 20° TPO groups was 5.5% and for DARA -1.9°. Statistical analysis showed no difference between left and right side on FHC ($p=0,45$) and DARA ($p=0,65$), but a significant difference between rotation groups ($p<0.0001$) for FHC and DARA. In vivo: mean FHC, for the 12° group, directly after surgery and six weeks after surgery was respectively 62% and 65%. The mean six weeks post surgery FHC in dogs undergoing a 20° acetabular rotation was 70%.

Discussion/Conclusions: Recent research questioned the validity of using plates angled more than 20°, since acetabular contact, coverage (in vitro) and FHC (in vivo) remain unchanged between 20° and 30°. Our results did show a significant different FHC between rotating 12° or 20°. Our clinical work showed this 12° angulation to result in joint stability. FHC in the 12° TPO group, six weeks after surgery, was mean 65% which is less than the 70% FHC in dogs that underwent a 20° TPO in our series and the 75% described in literature.

APPENDICULAR OSTEOSARCOMA PRESENTING AS A PATHOLOGIC FRACTURE IN DOGS: A RETROSPECTIVE STUDY. Bhandal J, Boston S*. Department of Clinical Studies, University of Guelph, Canada.

Objective: To evaluate clinical presentation of pathological fractures associated with osteosarcoma in dogs and to assess treatment methods and survival times of these patients.

Methods and Materials: Medical records of dogs that presented with pathological fracture associated with osteosarcoma from January 1997-May 2008. Dogs were included in the study if they had a presumptive or definitive diagnosis of osteosarcoma. Radiographic details, histopathology, or cytology findings were recorded. Survival times were assessed. Influence of age, sex, breed and other concurrent treatment were also studied as potential risk factors.

Results: Twenty-five dogs were included in this study. In the majority of the dogs, fracture was associated with minor trauma and lameness preceding

fracture. Rottweilers, Irish Wolfhounds and Greyhounds were the most common breeds. Twenty-two dogs were evaluated for pulmonary metastases and none of these dogs had evidence of pulmonary metastases. Immediate or delayed euthanasia was performed in 52% and 16% of the cases respectively. One case was not treated and died naturally 90 days after diagnosis (4%). 28% of the patients were treated with amputation alone (n = 3, survival time 434d, 379d and 1 lost to follow up), amputation and chemotherapy (n = 1, survival time 613 days), or internal fixation with no chemotherapy (n = 3, survival time 417, 112 and 109d). Overall median survival time was 110.5 days (range, 0–613 days). Median survival time of the treated patients was 406.5 days. No specific risk factors for pathological fracture were specifically identified.

Discussion/Conclusion: Treatment for pathologic fracture should be considered because survival times were comparable to historical reports of treated dogs with appendicular osteosarcoma without pathological fracture. Patients that underwent treatment did well overall. Although amputation is the most common option discussed with clients following pathological fracture, internal fixation may be considered if the owners are averse to amputation and if fixation is technically feasible.

INVASIVE PIN DISTRACTION OF THE STIFLE JOINT FACILITATES ARTHROSCOPIC DIAGNOSIS AND TREATMENT OF MEDIAL MENISCAL TEARS IN DOGS. Böttcher P.*, Winkels P., Oechtering G. University of Leipzig, Germany.

Introduction: The incidence of meniscal tears in association with cranial cruciate ligament (CrCL) insufficiency has been reported to be as high as 77.3%, most commonly affecting the caudal horn of the medial meniscus in the form of a bucket-handle tear. Diagnosis of substantial meniscal tears the day of CrCL stabilization may improve the overall functional outcome. However, persistent or recurrent lameness potentially attributed to overlooked meniscal injury has been reported to occur in 6.3% to 17.4% of the treated stifles. We hypothesized that distraction of the medial joint space would allow for a better insight into the medial compartment, potentially increasing the diagnostic accuracy of arthroscopy in regard to medial meniscal pathologies.

Material and Methods: A linear side-bar was constructed allowing invasive pin distraction of the stifle joint. After placing a threaded K-wire percutaneously into the distal femur and the proximal tibia the distractor was attached on the medial aspect of the knee joint. Elongation of the side-bar resulted in opening of the medial joint space. Applying craniocaudal pressure on the proximal end of the distractor produced cranial tibial thrust, further improving the view onto the medial meniscus. Design efficacy of the device regarding distraction of the medial joint compartment, visualization and probing of the medial meniscus as well as performing meniscal surgery was determined by clinical use in more than 35 stifles affected by natural CrCL insufficiency.

Results: Complete visualization as well as thorough probing of the caudal horn of the medial meniscus, even in the presence of a stable remnant of the CrCL or severe periarticular fibrosis, was possible with the use of the distractor. Partial meniscectomy was performed with subjectively more ease, higher speed and less damage to the joint surfaces than without invasive joint distraction. Complications encountered so far have been the intraarticular placement of one of the transfixation pins in 2 stifles.

Discussion/Conclusion: Invasive joint distraction has been shown to improve the arthroscopic diagnosis of medial meniscal pathologies. The relative invasiveness applying the "Leipzig Knee Distractor" is believed to be negligible. When using properly sized K-wires overstretching of the medial collateral ligament seems not to be of concern.

PHENOTYPIC CORRELATION BETWEEN HIP AND ELBOW DYSPLASIA IN THE DOG. Cachon T., Maitre P., Arnault A., Remy D., Fau D., Carozzo C.*, Viguier E.*, Genevois JP. National Veterinary School of Lyon, France.

Introduction: Hip dysplasia (HD) and elbow dysplasia (ED) are among the most common orthopedic diseases of medium to large breed dogs. As they are encountered in similar breeds, many dogs are simultaneously affected by HD and ED.

Objectives: The purpose of this study was to look for the phenotypic correlation between hip and elbow dysplasia and to the risk ratio linked with the two conditions.

Material and Methods: Based on radiographs which were submitted for authoritative grading, 1411 dogs simultaneously screened for HD and ED were included in the study

Results: In this population, we found that the risk ratio for an animal to be simultaneously affected by HD and ED is 1.67. For a dog with ED, risk ratio to be affected by HD increases with the grade of ED. Similarly, for a dog affected by HD, risk ratio to be affected by ED increases with the grade of HD.

Discussion: We found a statistically significant, though low, correlation between HD and ED. In a dog affected by HD or ED, the clinician should look for the second condition in the same animal. Due to the low, yet positive, correlation, selection against one trait will not effect the other trait sufficiently. Therefore selection has to be conducted at reduction of HD as well as reduction of ED.

SURGICAL TREATMENT OF LUMBOSACRAL DISEASE USING A TRANSILIAC APPROACH. Cachon T., Maitre P., Collard F., Remy D., Fau D., Viguier E.*, Genevois JP., Carozzo C. National Veterinary School of Lyon, France.

Introduction: Lumbosacral disease is mainly the result of disc disease and/or foraminal stenosis. Conventional surgical treatment is based on bony decompression by dorsal laminectomy and/or foraminotomy. However, with those techniques, the exit zone of the foramen and disc are always difficult to visualize. A lateral approach to the L7-S1 disc and foramen has been described for humans and recently in dogs. A transiliac approach of the L7-S1 disc and foramen was described to allow a lateral exposure of those structures.

Objectives: The purpose of this study is to describe the use of lateral foraminotomy and/or corpectomy via a transiliac approach to treat lumbosacral disease in dogs.

Materials and Methods: Dogs with lumbosacral disease treated by lateral foraminotomy and/or corpectomy via a transiliac approach were included in this study. Medical records were reviewed. Recorded information included breed, age, sex, duration of the clinical signs, neurologic examination results of pre and postoperative diagnosis imaging, surgical finding, complications and follow-up. Follow up was available for the first 3 post-operative days and at 1 month post-op.

Results: 3 dogs were included in this study. Surgical procedure included 2 unilateral foraminotomy and 2 lateral corpectomy. No neurological progression was observed in the 3 dogs during the post-operative period. Two dogs (dog 1 and 3) were discharged from the hospital at day 3. Dog number 2 died from severe sepsis 3 days after the surgery secondary to an acute cystitis. In the two dogs where a foraminotomy was performed, a significant enlargement of the foramen was observed in its entry, middle and exit zones. Results of the surgical procedure was judged to be excellent in dog 1 and good in dog 3 at 1 month post-operative.

Discussion: Lateral foraminotomy and/or corpectomy is feasible via a transiliac approach and could lead to good post-operative improvement. The transiliac approach seems to be safe and no complication related to the iliac window was observed. This approach allows a good enlargement of the three zones of the foramen.

KINETIC AND SPATIO TEMPORAL MODIFICATIONS OF NORMAL DOG GAIT INDUCED BY STAIR DESCENT. Colin A., Le Quang T., Poujol L., Maitre P., Viguier E.* Ecole Vétérinaire, Université de Lyon, France.

Introduction: Studies by Higginson indicate that the activity of descending stairs could reveal a subclinical front leg lameness. Hence, it has been proposed that dogs suffering from forelimb lameness should be prevented from descending stairs to prevent pain. There is no data in the veterinary literature concerning the biomechanical changes in dog gait immediately after a stair descent.

Objectives: The aim of this study was to provide objective dog gait analysis of the first steps taken after stair descent using a walkway pressure platform (GAITrite).

Materials and Methods: 20 sound dogs, 10 retrievers and 10 Labradors, 6 females and 14 males (30.6 ± 3.1 kg and 28 ± 9 m) were tested on a 4 meters walkway after stair descent. Parameters calculated were: stance time, number of activated sensors (surface of the stance), maximum peak of pressure of the stance. For each parameter, ratios were calculated to compare each paw with the first front step and the other normal and regular steps.

Results: Step sequence for all dogs was: first paw (P1) a forelimb (FaL), second paw (P2) the contralateral forelimb (FbL), third paw (P3) the FaL ipsilateral hindlimb (HaL), fourth paw (P4) same as FaL, and fifth paw (P5) the last hindlimb (HbL). After the five first paws, the sequence became a regular walk sequence. For all dogs and parameters we observed the same diagrams: stance time: P5 > P4 > P2 > P3 > P1; stride time: P1 < P2 < P3 = P4 < P5 = mean stride time; maximal pressure: P1 > P2 > P4 > P3 > P5; number of sensors: P1 > P2 > P4 > P3 > P5

Conclusion: This study provides complete data and description of kinetic and spatio-temporal parameters of sound dogs gait induced by stair descent. It showed a constant and regular transitional sequence of five steps before the regular walk sequence. Dogs adjusted their gait to the end of the slope. The three first steps showed a short and heavy contact. This study confirms Higginson's findings and our clinical experience. Stair descent could be used

in the diagnosis of forelimb lameness to increase the stress on the forelimbs. Stair descent should be forbidden in the medical or surgical treatment of forelimb orthopedic lesions during the healing process.

TREATMENT OF AN UNUSUAL CASE OF OESOPHAGEAL DIVERTICULUM IN A DOG. ¹G. de la Villeon, ²C. Poncet*, ¹IMM-Recherche, Paris, France ²Centre Hospitalier Vétérinaire, Fréjus, France.

A four year-old male Shih-Tzu was examined for a 4-year history of regurgitation and vomiting. A radiographic examination of the esophagus was carried out after a swallowing of barium sulfate and this revealed a 4-cm esophageal diverticulum in the cranial portion of the thorax, running from the third rib to the base of the heart. Despite a guarded prognosis if untreated, surgical treatment was initially declined by the owners. Four years later, a dramatic worsening of the symptoms occurred: massive weight loss, increased frequency and quantity of vomiting and regurgitations, general weakness. This clinical evolution led to reconsideration of surgical treatment. A major increase in the size of the diverticulum (4 to 10 cm in diameter) was documented pre-operatively by means of a contrast radiographic study and esophagoscopy. Considering the thoracic location of the diverticulum, a cranial median sternotomy approach was used and the diverticulum removed using gastro-intestinal staplers (GIA[®]). Post-operative recovery and follow-up were uneventful.

This case report describes a probably congenital esophageal diverticulum at a very uncommon location, and shows the evolution of that lesion over a 4-year period. It also demonstrates the efficacy of a modified surgical approach and of the use of gastro-intestinal staplers, which have enabled the removal of this diverticulum with a positive outcome.

EXPERIMENTAL ASSESSMENT OF COLLATERAL THERMAL INJURY CAUSED BY ELECTROSURGICAL TISSUE SEALING. Dunay M. P., Tóth A., Németh T. Faculty of Veterinary Science, Szent, István University, Budapest, Hungary.

The spread and extent of thermal injury caused by electrosurgical sealing devices has not yet been described precisely. The aim of this study was to assess the surgical safety of the novel SurgRx EnSeal[™] electrosurgical tissue sealing system, with special emphasis on accurate examination of the collateral thermal injury. A total of 174 samples from different organs (liver, rectus abdominis muscle, spleen, gastric, mesenteric and splenic vessels, external jugular vein and common carotid artery) of experimental pigs sealed 'in vivo' using the 5-mm laparoscopic tissue sealing device were harvested and subjected to histological evaluation using hematoxylin and eosin as well as nitroblue tetrazolium chloride staining. The microscopic collateral thermal injury zones were measured by comparing the digitalized sections to the digitalized picture of a micrometer slide with 0.01 mm units. Descriptive statistical and box plot analysis was used. Sections stained with hematoxylin and eosin showed obturated vessels and the modification of collagen fibers not sharply demarcated from the surrounding normal tissue. Nitroblue tetrazolium chloride staining showed the sealed region as a whitish zone sharply separated from the dark blue-/violet color of the intact adjacent tissue, making it possible to measure the microscopic lateral thermal injury zones. The results did not differ significantly according to the different organs. The overall injury zone of the 174 samples was: mean 5.5 ± 1 mm, median 5.6 mm (Fig. 2). The nitroblue tetrazolium chloride enzyme histochemical analysis has been described in the human medical literature as a useful method for the precise assessment of laser-induced thermal tissue injury. The technique labels the thermolabile enzyme activity of lactate dehydrogenase, which has been shown to correlate well with the thermal tissue injury. Our study has revealed that nitroblue tetrazolium chloride enzyme histochemistry combined with the digitalized microscopic measuring protocol is suitable for the objective evaluation of collateral thermal injury, and that this method can be used for the precise comparison of different electrosurgical devices used for hemostasis. The study has also confirmed the surgical safety of the tissue sealing system used.

SUCCESSFUL USE OF TAMOXIFEN IN A DOG WITH SCLEROSING ENCAPSULATING PERITONITIS. S. Etchepareborde, A. Hamaide*. University of Liège, Belgium.

Introduction: Sclerosing encapsulating peritonitis (SEP) in dogs is rare and associated with a high mortality rate. We report the first use of tamoxifen as adjuvant therapy in a case of SEP unresponsive to administration of steroids alone.

Case Presentation: Three months after a surgery for abdominal foreign body removal and septic peritonitis, a 4 year old female German Shepherd was diagnosed with sclerosing encapsulating peritonitis (SEP). Ultrasonography followed by exploratory laparotomy revealed a sac-like fluid struc-

ture totally occupying the peritoneal cavity. Histopathology confirmed the diagnosis of SEP. After surgery, the dog was first treated with oral methylprednisolone (1 mg/kg BID) for 1 month. However, the ascites persisted and the dog's condition worsened. During a second exploratory laparotomy, enterolysis was performed. The abdomen was left opened 4 days postoperatively. Bandages were changed as often as necessary until closure. Tamoxifen at a dosage of 1 mg/kg SID was initiated at this point. Within 2 weeks, the dog's condition improved dramatically but ascites was still present. Two months later, the dog's condition was optimal according to the owner and no more fluid was present in the abdomen. Methylprednisolone was slowly tapered over 2 months then discontinued. Tamoxifen was pursued for another month and discontinued after ultrasound confirmation of the absence of recurrence of the ascites. No complication was encountered except swelling of the vulva.

Discussion/Conclusion: SEP is a known life-threatening complication after peritoneal dialysis in humans. This condition has been infrequently reported in dogs and cats. Most of the animals die or are euthanized because of chronic weight loss, ascites and progression of concurrent disease. Tamoxifen has been successfully used in humans with SEP in combination with steroids or alone if suspicion of sepsis was considered. To the authors' knowledge, this is the first report of a dog with SEP treated with tamoxifen. This dog was unresponsive to methylprednisolone alone and was successfully treated with aggressive surgery and addition of tamoxifen to the current treatment. Considering the severity of the disease, the low cost of the drug and the minor complication reported in this case, the addition of tamoxifen could be recommended for the current treatment of SEP in dogs.

ARTHROSCOPIC TREATMENT OF OSTEOCHONDROSIS DISSECANS OF THE FEMORAL HEAD IN A DOG. Haudiquet Ph*, Rochereau Ph. Clinique Vétérinaire de l'Ouest, Angers, France.

A three-month-old Bernese mountain dog was first referred to our clinic for a bilateral Salter-Harris type I fracture of the capital femoral physis. The fractures were stabilized using Kirschner wires. The dog recovered uneventfully and the implants were removed one month later. Five weeks later, the dog was referred again for a rolling gait and a bilateral hindlimb lameness. A ventrodorsal hip extended view (O.F.A.) revealed a bilateral subluxation of femoral heads, a complete closure of the left physal cartilage and mineralised fragments facing the right femoral neck. On the ventrodorsal radiographic view with the hip joints under compression, a "parcellar" fracture of the right cranial acetabular rim was suspected. An arthroscopic evaluation of the femoral heads and acetabuli, before a subsequent bilateral double pelvic osteotomy (DPO), were proposed and accepted by the owner. The right hip joint was first evaluated. The "parcellar" fracture of the cranial acetabular rim was confirmed; the fragment was removed through the instrument portal. Despite this fragmentation, the femoral head and the acetabular cavity appeared well-formed; a D.P.O. was then performed (D.P.O. plate 30°). An arthroscopic examination of the left hip joint was performed two days later. A large, bipartite cartilage flap was visualized just adjacent to the fovea capitis, on the craniodorsal aspect of the femoral head. The flap was removed using a grasping forceps; the edges of the defects were debrided with a right-angle probe. However, there was no sign of advanced degenerative joint disease. A left D.P.O. was then performed (D.P.O. plate 30°). The dog was walking the day after the second surgery, and was discharged four days later. Histological examination confirmed the diagnosis of an OCD of the femoral head. Clinical and radiographic controls were performed one and two months later. The dog had good functional limbs recovery despite a persistent rolling gait. On physical examination, the hips joints appeared stable; no pain was elicited at the manipulation of joints. A subluxation of the left femoral head was still observed on the ventrodorsal hip extended view. No obvious degenerative joint disease signs were observed.

COMPARISON OF HAND-SEWN AND STAPLED ANASTOMOSES PERFORMED BY NON-EXPERT SURGEONS IN A PORCINE MODEL OF SMALL INTESTINAL RESECTION. Hidalgo A.^{1,2}, Jardel N.¹, Moissonnier P.¹, Riquois E.³, Viateau V.¹ ¹Maisons-Alfort France, ²Villeneuve d'Ascq France, ³Lures France.

Objective: To evaluate and compare the duration and immediate bursting pressures of hand-sewn and stapled anastomoses performed for reconstruction of jejunal or ileal enterectomies in a controlled in vivo experimental trial by surgeons with no specific expertise in intestinal surgery.

Study Design: Prospective randomized in vivo study.

Animals: Three female domestic pigs (Non survival surgical study conducted according EU Ethical Guidelines).

Methods: Four interns whose internships in small animal practice were almost complete, performed eight 5 cm long jejunal or ileal enterectomies. Four of these were repaired by hand-sewing and four repaired by a one stage

functional end-to-end anastomosis and resection (OSFEEAR). Treatment selection was randomized. Total time to perform the intestinal resections and anastomoses (TST) as well as time to perform the anastomoses (AT) were recorded. Bursting pressure of each anastomosis was subsequently recorded with a water manometer. Bursting pressure was defined as the pressure at which the leakage was observed during water inflation (with a maximum pressure of 80 cm of water).

Results: Mean AT differed significantly ($p < 0.0001$) between hand-sewn and stapled anastomoses (14.2 ± 1.44 min and 3.4 ± 0.84 min, respectively). Mean TST differed significantly ($p < 0.0001$) between hand-sewn and stapled anastomoses (18.5 ± 1.75 min and 7.3 ± 1.80 min, respectively). Incidence of leakage differed significantly between stapled and hand-sewn anastomoses ($p < 0.01$): 10 of 16 hand-sewn anastomoses leaked (leakage occurred between 50 and 80 cm of water) whereas none of the 16 stapled anastomoses leaked.

Conclusion and Clinical Relevance: In the present study, OSFEEAR performed by non-expert surgeons was completed faster and presented a higher immediate bursting pressure than hand-sewn anastomoses. Stapled anastomotic technique also equalized anastomotic reliability. However, further clinical trials are needed to draw pertinent conclusions.

TRANSPOSITION OF SARTORIUS MUSCLE FOR TREATMENT OF RECURRENT COMMON CALCANEAL TENDON RUPTURE. P. Maitre, C. Carozzo, JP. Genevois, D. Fau, E. Viguier*. Ecole Nationale Vétérinaire, Lyon, France.

Introduction: The aim of this study was to describe an original technique for revision treatment of common calcaneal tendon rupture following failure of conventional surgical treatment; two cases, one dog and one cat.

Materials and Methods: The first case was a large breed dog. The initial rupture was due to a wild boar bite, and was surgically treated soon after the injury by tendon suture and immobilization by bandage. One week after surgery, the wound was infected and the suture loosened. The second case was a domestic shorthaired cat. The initial rupture was caused by a fall, and was surgically treated by tendon apposition and suture with immobilization by bandage. After a first recurrence with loosening of the tendon suture, the common calcaneal tendon was sutured and strengthened with a nylon synthetic prosthesis. Immobilization was achieved by external fixation and second recurrence occurred after removal of the fixator. Both cases were managed in a similar way. Surgery consisted in debridement of both parts of the tendon, apposition and suture with a three loop pulley pattern. A craniomedial skin incision was made to isolate the caudal band of the sartorius muscle. The band was sectioned proximally and passed under the skin in the caudal aspect of the knee. The distal part was affixed on the common calcaneal tendon and sutured side by side by interrupted sutures. An external fixator was used to achieve immobilization for six weeks, then removed and replaced by a Robert-Jones bandage for two weeks allowing physiotherapy.

Results: Follow up examination showed a correct hindlimb function and no recurrence at 6 months.

Discussion and Conclusion: This surgical technique is simple and induces minimal damage. The procedure allows to reinforcement of the usual tendon suture. The technique has potential when sepsis might be a problem, when reinforcement by a synthetic prosthesis would be unwise, and in cases of recurrent rupture, when tendon integrity is impaired. Transposition of the caudal part of the sartorius muscle can be accomplished safely and effectively. This technique offers another option for the treatment of recurrent common calcaneal rupture.

BIOMECHANICAL EVALUATION OF DIFFERENT SIZES, CONFIGURATIONS AND NUMBERS OF LIGACLIPS REQUIRED TO ACHIEVE SECURITY OF CELLOPHANE BANDS. McAlinden A.B, Kirby B.M.* University College Dublin, Dublin, Ireland.

Introduction: The aim of this study was to determine the optimal way to secure cellophane bands using ligACLIPS.

Materials and Methods: Double folded (3 layer) cellophane bands were applied to a 10 mm diameter split circular jaw mounted on a servohydraulic materials testing machine (Zwick). Bands were secured with a different number (1–5), size (9.0 or 11.5 mm) or configuration (linear or alternating) of ligACLIPS (Autosuture Premium Surgiclip™, Tyco). Bands were loaded to failure in tension. Load at failure (ligACLIP slippage) was measured in Newtons and time measured in seconds. Two thicknesses (double folded three layer and single layer) cellophane bands were compared with four 11.5 mm ligACLIPS in an alternating configuration. Descriptive statistics were reported as mean \pm SD, with P value < 0.05 considered significant.

Results: The mean \pm SD ultimate load for all 9.0 mm ligACLIPS applied in an alternating configuration (4.16 ± 1.39 N) was significantly greater than

all 9.0 mm ligACLIPS applied in a linear configuration (2.98 ± 1.07 N) ($P < 0.05$). The mean \pm SD ultimate load for all 11.5 mm ligACLIPS applied in an alternating configuration (6.03 ± 2.02 N) was significantly greater than those applied in a linear configuration (4.35 ± 1.56 N) ($P < 0.01$). The ultimate load for the 11.5 mm ligACLIPS was significantly higher compared to the 9.0 mm ligACLIPS for any number of ligACLIPS or any configuration ($P < 0.05$). The mean \pm SD ultimate load for 4 alternating ligACLIPS applied to double folded (3 layer) cellophane (7.3 ± 0.31 N) was significantly greater than the same configuration applied to a single thickness cellophane band (3.49 ± 0.29 N) ($P < 0.01$).

Conclusion: Double folded cellophane is recommended over single thickness cellophane whenever ligACLIPS are being used as the sole method to secure the band. An alternating configuration of four 11.5 mm ligACLIPS is recommended.

ISOMETRIC POINTS IN THE CANINE STIFLE. J. Milgram^{1*}, Y. Meiner², S. Vaknin², A. Shapiro², R. Shahar^{1*}. ¹The Hebrew University of Jerusalem, Israel, ²Ben Gurion University of the Negev, Beer Sheva, Israel.

Introduction: The aim of this study was to determine the presence and location of isometric points in the canine stifle joint using a three dimensional kinetic model.

Material and Methods: A single hind limb, free of pathology, was used in this study. A CT scan with a slice thickness of 0.5 mm of the entire specimen was then performed. The specimen was then placed into a joint testing machine without any change in the relative position of the tibia and the femur. Four joint motion sensors were mounted on the tibia via wooden dowels placed prior to the CT scan. The knee was then released and flexed through 80 degrees with measurements taken every 5 degrees. The search for isometric points was limited to periarticular areas on both the femur and the tibia and included the origin and insertion sites of the collateral ligaments. Articular surfaces were also eliminated from the search. Each point on the femur was compared to all the points on the tibia at each position through 80 degrees of flexion. Isometric points were defined as any two points, one on the femur and one on the tibia, where the largest distance between the two points did not exceed the smallest distance between the two points by 0.2 mm throughout the range of motion.

Results: Four isometric areas were identified. The area on the lateral femur had a radius of 3 mm and was located cranially and distally to the lateral fabella. This area corresponded to an area, with a diameter of 9 mm on the tibia located in the area of the sulcus extensorius. The area on the medial aspect of the lateral femoral condyle had a 3 mm diameter and corresponded to an area of 7 mm located in the cranial intercondylar area of the tibia.

Discussion: This study confirms the isometric position of the cranial cruciate ligament. We were also able to demonstrate that isometric points exist on the lateral aspect of the stifle. The area on the femur is located cranially and distal to the lateral fabella and the area on the tibia is located cranially and caudally to the sulcus extensorius.

THEORETICAL CONSIDERATIONS OF THE EFFECT OF TPLO, TTA AND TTO ON TIBIAL THRUST – A PILOT STUDY. Moles, A., Day, R., Glyde, M*. Murdoch University, Western Australia.

Introduction: The purpose of this study was to estimate the compressive forces acting across the stifle joint and resultant tibial thrust at 5 different points throughout the stance phase of the walk and to compare the effect of TPLO, TTO and TTA upon thrust when performed according to their published surgical guidelines.

Materials and Methods: The left pelvic limb of a cadaver greyhound was placed in a specially designed leg press and loaded to replicate the femoral axis and joint angles of a walking dog at the 10%, 30%, 50%, 70% and 90% points of the stance phase. Radiographs were taken at each position and computer generated reconstructions of the leg created for morphometric measurements. Using previously published force plate data, the patellar tendon and calcaneal tendon forces were estimated by solving the moments acting around the stifle and hock joints. Cranial tibial thrust was estimated as the resultant vector of the compressive patellar tendon, calcaneal apparatus and vertical weight forces acting across the stifle joint. The effect of TPLO, TTA and TTO on tibial plateau angle relative to the tibial functional axis and the patellar tendon were then factored into the model allowing calculation of the resultant changes in tibial thrust afforded by these procedures.

Results: Cranial tibial thrust increased in magnitude through to the 70% point of the stance phase with the calcaneal tendon force being the major contributor to the resultant thrust vector. TPLO performed to 6.5 degrees neutralised tibial thrust at the 30% point of stance and then resulted in caudal tibial thrust. TTO resulted in caudal tibial thrust throughout the whole of the stance phase. In contrast, TTA was only able to reduce cranial tibial thrust by 43% to 67% in this model.

Conclusion: TPLO and TTO when performed under current guidelines both neutralise cranial tibial thrust and convert it to caudal tibial thrust. TTA fails to address the calcaneal tendon force and only reduces cranial tibial thrust, suggesting a reliance on secondary joint restraints. This may explain the increased incidence of postliminary meniscal tears reported with TTA compared to TPLO and TTO.

URETERAL DOUBLE PIGTAIL STENTING IN DOGS AND CATS: PRELIMINARY CLINIC RESULTS. Nicoli S, Zatelli A, D'Ippolito P, Martano M, Morello M, Campione S, Buracco P*. Università di Torino, Grugliasco, Italy, Clinica Veterinaria Pirani, Reggio Emilia Italy, Clinica Strasburgo, Palermo, Italy.

Introduction: Indications for ureteral stents include: ureteral obstruction by calculi, palliation of inoperable ureteral neoplasia, end-to-end ureteral anastomosis and adjuvant application after ureter transplant. There are few reports on the use of ureteral *double pig-tail* stent in dogs and cats. The aim of this study was to investigate the use of stents for ureteral obstruction by calculi and to review their effectiveness in preventing recurrence of obstruction.

Material and Methods: Patients considered eligible for the study were dogs and cats with ureteral stones and stone(s) in the ipsilateral renal pelvis. Work-up included laboratory evaluation, plain and contrast radiography and abdominal ultrasound. Immediately after ureteral stone removal and stent placement, radiographs were taken to evaluate the position of the stent. An ultrasonographic examination was performed 3 days later. Clinical, radiographic and/or ultrasound examinations were performed every 6–8 weeks. Efficacy of the stent was evaluated at follow-up by visualization of the renal calculi seen previously or their migration along the ureter without any ureter or pelvic dilation.

Results: Between 2006 and 2008, 14 stents were placed in 7 dogs and 5 cats. The age ranged between 5 and 132 months (mean 65.8, median 75) the body weight ranged between 2.2 and 20 Kg (mean 7.81; median 6.2). Two patients had a bilateral ureteral stenting; 2 modified stents (distal end cutted) were used in one of these. In 11 animals a polypropylene double pig tail open-ends stent (Optisoft, OptiMed, Germany, diameter 3 to 6 Fr; length 14 to 24 cm) was used. Follow up varied from 6 to 32 months (mean 19.1, median 21); ureteral stone without dilation were relieved in 100% of cases. All animals had signs of ureteral inflammation but no sign of infection (urinalysis). Major complications were observed in 2 animals: 2 migrations (modified stents) and 1 encrustation. No upper urinary tract dilation was recorded. No lower urinary tract infection or inflammation/pain were observed.

Conclusion: In our study, the presence of ureteroliths after stent positioning did not cause any upper urinary tract dilation. These preliminary results indicate that double j stents may safely be applied to relieve ureteral obstruction caused by ureteral calculi.

EFFECT OF CHITOSAN SCAFFOLD MICROSTRUCTURE ON MESSAGESYML STEM CELLS CHONDROGENESIS. G.R. Ragetyl, D.J. Griffon*, H.B. Lee, L.P. Fredericks, W. Gordon-Evans. University of Illinois, Urbana, USA.

Various biomaterial scaffolds have been investigated for cartilage tissue engineering; however, little attention has been paid to the effect of their microstructure on final construct characteristics. Chitosan biocompatibility and its similarity with glycosaminoglycans make it attractive as a scaffold for cartilage engineering. Our objective was to evaluate the effect of chitosan scaffold structure on the proliferation and chondrogenesis of mesenchymal stem cells. Chitosan fibrous scaffolds and chitosan sponges were seeded with mesenchymal stem cells in a chondrogenic medium. Constructs were analyzed 72 hours after seeding via scanning electron microscopy (SEM), weight measurements and DNA quantification. Constructs were cultured for 10 or 21 days prior to confocal microscopy, SEM, histology, quantitative analysis (weight, DNA, and glycosaminoglycan (GAG)) and quantitative real time PCR. Mesenchymal stem cells maintained a viability above 90% on the chitosan scaffolds. The cellularity of the constructs was similar at 72 hours, 10 days and 21 days. However, based on the GAG quantification, matrix production was improved in chitosan fibrous constructs. Collagen II gene mRNA expression was also greater for the fibrous scaffolds. The microstructure characteristics of chitosan scaffolds affect chondrogenic differentiation of mesenchymal stem cells. Fibrous scaffolds stimulate chondrogenesis compared to sponge-like scaffolds.

USE OF A VESSEL SEALANT DEVICE*FOR SPLENECTOMY IN 27 DOGS WITH NATURALLY OCCURRING SPLENIC DISEASE. ¹P. Rivier, ²E. Monnet*,¹J-F. Bardet's. Emergency and Referral Clinic, Neuilly sur Seine, France, ²Colorado State University, Fort Collins, USA.

Objective: To describe a technique for splenic vessels hemostasis and report complications and outcome after use of bipolar sealing device during splenectomy in dogs.

Study Design: Retrospective case series.

Inclusion Criteria: Dogs that underwent a splenectomy for a splenic condition with a vessel sealant device (Ligasure[®], Valleylab, Boulder, CO) between January 2006 and March 2008 were entered in the study.

Procedures: Data from medical records included sex, breed, body weight, age at surgery, preoperative CBC and serum biochemical panel results, and coagulation profiles results. Splenectomy was performed using a vessel sealant system. Number of ligatures needed for splenectomy and complications were recorded. Splenic artery diameter was measured one centimeter before terminal branching using a micrometer. Ease of vessel sealant device use was evaluated subjectively. All dogs had PCV or complete blood counts and total protein concentration performed the day after surgery. Follow up information was obtained by return visit.

Results: The splenectomy was performed successfully in each dog with the vessel sealant device. None of the dogs required ligation and minimal hemorrhage was observed from the pedicle. The splenic artery was dissected and adequately sealed in each case. Linear correlation analysis showed that the splenic artery diameter is positively correlated the body weight. One dog was presented four days after surgery with a hemoabdomen. Abdominal exploration revealed splenic pedicle hemorrhage and pancreatitis, the vessel sealant device was used to coagulate splenic pedicle bleeding. The dog was still alive at suture removal.

Conclusions and Clinical Relevance: Based on our clinical experience and despite its high initial cost, we believe that the vessel sealant device is a useful tool for performing canine splenectomy quickly with good hemostasis, minimal to no need for surgical dissection before application, no remaining foreign material and minimal postoperative complications. Distal branch of the splenic artery perfusing the left part of the pancreas has to be identified and carefully preserved while sealing the splenic artery.

VARIATION IN POSITION OF THE MEDIAL FABELLA IN WEST HIGHLAND WHITE TERRIERS AND OTHER DOGS. Störk CK*, Petite AF, Norrie R, Polton GA, Rayward RM. Davies Veterinary Specialists, Higham Gobion, UK.

Objective: To investigate whether West Highland White Terriers (WHWT) exhibit significant variation in the position of the medial fabella compared to both i) small and ii) large breed dogs.

Materials and Methods: Criteria for the normal location of the medial fabella on a caudocranial radiograph were established. A retrospective analysis was undertaken of a consecutive series of bilateral caudocranial stifle joint radiographs from 70 WHWT, 100 small (S) and 100 large (L) control dogs by three reviewers. Medial fabellar location, cruciate ligament disease and medial patellar luxation were examined within and between groups.

Results: Abnormal medial fabellar location was identified in 70%, 9% and 0% of WHWT, S and L, respectively. In the vast majority of the affected dogs, the fabella was found in a mediolateral location. Presence of concurrent cranial cruciate ligament disease or medial patellar luxation and body weight were excluded as confounding factors.

Discussion/Conclusion: WHWT appear predisposed to and have a high prevalence of an abnormal mediolateral location of the medial fabella. The authors suggest this is an incidental finding and should not be confused with true pathological fabellar displacement.

ND:YAG SURGICAL LASER EFFECTS IN CANINE PROSTATE TISSUE: TEMPERATURE AND DAMAGE DISTRIBUTION. S.A. van Nimwegen, H.F. L'Eplattenier*, A.I. Rem, J.J. van der Lugt, J. Kirpensteijn*. Faculty of Veterinary Medicine, Utrecht University, Utrecht.

The use of the Nd:YAG surgical laser for prostate surgery in dogs was investigated *in vitro* using a combination of Schlieren imaging and *ex vivo* tissue morphology and histology. Schlieren imaging is an optical technique to visualize inhomogeneities in transparent media, such as those caused by temperature gradients. A transparent polyacrylamide gel serves as a model for laser tissue interaction. Spatial distribution of Nd:YAG laser-induced temperature distribution was investigated using contact and free beam laser exposure. The resulting images were compared to laser-induced thermal damage in *ex vivo* canine prostate tissue. Tissue samples were equipped with thermocouple probes to measure tissue temperature at 3, 6, 9 and 12 mm depth. The tissue surface was irradiated with Nd:YAG laser in contact or non-contact mode for up to 20 s, using powers from 5 W to 20 W. The extent of the thermal damage was measured histologically. The threshold temperature for acute thermal tissue damage was $69 \pm 6^\circ\text{C}$ (mean \pm sd). Contact mode laser exposure caused vaporization of tissue. Mean extent of tissue damage underneath the vaporization crater floor was $0.9 \pm 0.6\text{mm}$ after 5, 10 or 20 s of contact mode laser irradiation at 10 W, whereas 20 W non-contact exposure up to 20 s caused up to $4.7 \pm 0.2\text{mm}$ coagulation necrosis in depth. Schlieren

imaging corresponded well with the results of laser-induced thermal damage in prostate tissue.

TREATMENT OF SEVERE FEMORAL SHORTENING AND DEFORMITY BY OPEN WEDGE OSTEOMY AND DISTRACTION OSTEOGENESIS. Vi-guier E.^{*1}, Cachon T.¹, Bleiss K.², Odent T.³ ¹Ecole Nationale Vétérinaire, Université de Lyon, France. ²Ecole Nationale Vétérinaire d'Alfort, Maison Alfort, France. ³Service d'orthopédie pédiatrique, Hôpital Necker, Paris, France.

Introduction: A ten month old, Leonberger was diagnosed with severe femoral shortening and deformity causing a grade IV patellar luxation.

Case Report: The dog was successfully treated using an opening wedge osteotomy with femoral derotation and lengthening. Bone distraction was achieved by the use of an Orthofix external fixator. The rate of lengthening was between 1,5 and 2 mm twice a day. Almost 70 mm of bone lengthening was obtained. Intensive, post operative physiotherapy was performed. Six months after initial surgery, a tenotomy of the digital flexors was performed because the dog was unable to extend the toes and was walking on the dorsal aspect of the paw.

Sixteen months after the initial surgery, the patient was able to trot and walk normally. In spite of a gastrocnemius fibrosis, a good range of stifle joint motion was present. An intensive physiotherapy program was performed (passive and active, shock wave, pool and treadmill).

Discussion/Conclusion: To our knowledge, there are few descriptions of femoral lengthening procedures in the veterinary literature. Lengthening rate was adjusted in response to information from ultrasonographic examinations made during the convalescent period. Treatment of severe femoral shortening and deformity can be managed successfully in dog using the technique described here. However, the use of rigid fixation and a high level of post operative physiotherapy and other care appears necessary.

FEASIBILITY AND SAFETY OF SELECTIVE AND SUPERSELECTIVE INTRA-ARTERIAL CARBOPLATIN ± MELOXICAM DELIVERY FOR UROTHELIAL TUMORS IN DOGS. Weisse C, Berent A, Sorenmo K, Solomon JA, Soulen M. University of Pennsylvania, Philadelphia, PA.

Dogs with transitional cell carcinoma (TCC) are typically diagnosed with locally advanced tumors and up to 50% have distant metastasis at the time of diagnosis. Despite treatment most dogs will die within 12 months of diagnosis, often from progression of local disease. More effective local tumor control is necessary in order to improve outcome. Chemotherapeutic agents have activity in dogs with TCC, however these agents are associated with systemic toxicity, therefore preventing significant dose escalation. Intra-arterial delivery of chemotherapy and NSAIDs can provide increased intra-tumoral drug concentration and may therefore improve the anti-tumor activity. The investigators hypothesized that these treatments would be well tolerated and not result in any excessive morbidity or toxicity when compared with intravenous administration.

All patients were placed under general anesthesia and vascular access to the femoral or carotid artery was obtained. Interventional radiology techniques were used under fluoroscopic guidance to gain selective or superselective access to the internal iliac or prostatic/caudal vesical artery, respectively. Systemic doses of chemotherapy with or without meloxicam were administered and the animals recovered. The treatments were repeated following standard chemotherapy protocols.

The 23 procedures performed in 9 dogs (1–5/dog) were well tolerated with minimal complications. Two procedures (2/23) resulted in myelotoxicity and eight (8/23) had minor complications including mild temporary lameness, GI upset, and thrombosis.

Selective and superselective intra-arterial administration of chemotherapy with or without meloxicam is safe in dogs with naturally-occurring urothelial tumors.

SENSITIVITY AND SPECIFICITY OF ARTHROSCOPIC ESTIMATION OF POSITIVE AND NEGATIVE RADIO-ULNAR INCONGRUENCE IN THE DOG IN VITRO. Werner H., Grevel V.^{*}, Oechtering G., Böttcher P.^{*} University of Leipzig, Germany.

Introduction: The ability to detect radio-ulnar incongruence (RUI) is important when considering procedures to modify the load distribution in elbows with clinical signs of elbow dysplasia. The objective of this study was to determine the sensitivity and specificity of arthroscopy in diagnosing experimentally induced RUI in the canine elbow joint in vitro. Following on from previous studies, short ulna (negative RUI) and a short radius scenarios were considered.

Material and Methods: Nine normal forelimbs were harvested from adult middle to large breed dog cadavers. Shortening and lengthening of the radius

by 1 and 2 mm increments was performed using an established experimental in vitro model of RUI. The type and degree of RUI was assessed by standard medial elbow arthroscopy using a 1.9 mm 30° foreoblique arthroscope and a graduated arthroscopic palpation hook. For each elbow 8 RUIs including the congruent joint were blindly evaluated by a single investigator, estimating the radio-ulnar conformation at 1 mm increments (–2, –1, 0, 1, 2). Altogether 72 models were investigated.

Results: The sensitivity for identifying an incongruent joint was 0.98 (95% CI: 0.90 to 0.99). The specificity for identifying a congruent joint was 0.89 (95% CI: 0.65 to 0.98). Analyzing the data only in respect to a congruent joint versus one with a shortened radius (positive RUI) resulted in a sensitivity of 0.96 (95% CI: 0.80 to 0.99) and a specificity of 1.00 (95% CI: 0.92 to 1.00), respectively. When comparing a congruent joint versus one with a shortened ulna (negative RUI) sensitivity and specificity were 1.00 (95% CI: 0.88 to 1.00) and 0.95 (95% CI: 0.85 to 0.99), respectively. Overall 93% of the 72 radio-ulnar joint conformations were identified correctly.

Discussion/Conclusion: Arthroscopy allows for precise estimation of positive as well as negative RUI – at least in vitro. In comparison to radiography and computed tomography arthroscopy has been shown to be of superior accuracy in vitro. Nevertheless, accuracy of arthroscopy for the diagnosis of RUI in clinically affected cases has still to be determined, as this is considered to be more challenging than in vitro.

RADIOGRAPHIC LANDMARKS FOR TIBIAL TUNNEL PLACEMENT IN INTRAARTICULAR, ANATOMIC CRANIAL CRUCIATE LIGAMENT RECONSTRUCTION IN DOGS. Winkels P., Werner H., Oechtering G., Böttcher P.^{*} Department of Small Animal Medicine, University of Leipzig, Germany.

Introduction: Freehand drilling of a tibial bone tunnel for anatomic reconstruction of the cranial cruciate ligament (CrCL) from extra- to intra-articular might result in inadequate tunnel placement when performed under arthroscopic control. Placement of the tibial tunnel in people is controlled either intraoperatively (using fluoroscopy) or postoperatively on biplanar radiographs of the treated knee. The aim of this study was to establish radiographic landmarks in respect to the craniocaudal and mediolateral position of the tibial footprint of the CrCL (TFCrCL).

Materials and Methods: 46 cadaveric tibiae from medium to large breed dogs were stripped of all soft tissue except the CrCL. The contour of the TFCrCL was marked with ink stain and at each of the most cranial, caudal, medial and lateral aspects of the TFCrCL a 0.8 mm K-wire was drilled into the tibial plateau. On an axial digital photograph of the tibial plateau the marked contour of the TFCrCL was traced and the two-dimensional position of the centre of mass (CoM) of the TFCrCL determined using custom made image analysis software. On biplanar radiographs of the tibiae the positions of the K-wires defining the most medial and cranial margins of the TFCrCL were measured in respect to the maximal tibial depth (mTD) and width (mTW) of the tibial plateau. In combination with the position of the CoM measured on the digital photograph of the tibial plateau the craniocaudal and medio-lateral position of the CoM were obtained in percentage of the mTD and mTW.

Results: The mean craniocaudal position of the CoM of the TFCrCL was at 61% of the mTD (95% CI: 60 to 62%) and the mean mediolateral position was at 36% of the mTW (95% CI: 35 to 37%).

Discussion/Conclusion: The radiographic position of the tibial footprint of the CrCL is highly constant within the population of middle to large breed dogs. With the help of this data the position of a tibial drill tunnel may be evaluated either intraoperatively using fluoroscopy or postoperatively on biplanar radiographs. The functional outcome after anatomic reconstruction of the CrCL may improve if proper tunnel placement is assured.

SECOND SURGICAL SALVAGE AFTER RECURRENCE OF CANINE INSULINOMA. Wouters, EGH., Kirpensteijn, J.^{*} Faculty of Veterinary Medicine, Utrecht University, The Netherlands.

Insulinoma (INS) is tumor of the β -cell of the islets of Langerhans that secretes insulin despite the presence of hypoglycemia.

Over 95% of canine INS are malignant. INS metastasize to regional lymph nodes, liver and omentum. Median survival time is significantly longer for dogs treated surgically than for dogs treated medically only, and varies from 12 to 18 months. Although surgery is the treatment of choice, recurrence of clinical signs caused by the metastases can be expected in 100% of the cases.

Two dogs were successfully operated for metastatic INS when clinical signs had recurred after removal of the primary tumor and metastases. All abnormal lymph nodes were removed and the liver metastases were ablated using a surgical Nd:YAG laser. Pathological examination of the removed tissue confirmed the diagnosis of β -cell tumor. Directly after surgery the glucose values increased to high normal which is important for a good prognosis. Both dogs

have been and are closely examined during the months after surgery. First results show that a second surgical salvage therapy combined with medicine is a viable option for dogs with recurrent metastatic INS leading to a much higher survival time. Upon subsequent recurrence, a protocol using a combined therapy of diazoxide, prednisone and special diet was used to apparently good effect with blood glucose levels maintained within normal limits.

LARGE ANIMAL

Short communication

EFFECT OF COLIC ON PRO- AND ANTI-OXIDANT FUNCTIONS OF THE BOWEL IN HORSES. P. Cayado¹, G. Marañón¹, W. Manley¹, C. García², R. León¹, B. Olábarri¹, M. Sánchez de la Muñca³, E. Vara². ¹Horsepital SL; ²D. Bioquímica y Biología Molecular, F. Medicina; and ³D. Medicina y Cirugía Animal; UCM, Madrid, Spain.

Background: Although there has been much research directed at colic-induced tissue injury, the pathogenesis of colic syndrome remains poorly understood. Colic could be accompanied by changes in the morphology and physiology of the bowel. This process might be due, at least in part, to the accumulation of oxidative damage induced by reactive oxygen (ROS) and reactive nitrogen (RNS) species.

Objectives: To investigate changes on free radical processing in colic horses, as compared with control horses.

Methods: In this study we included 30 horses with acute abdominal pain. They all had a complete clinical examination on admission. Blood samples were obtained from the jugular vein and centrifuged at 3000 rpm × 10 min. In those horses requiring surgery, two samples (proximal, and distal to the stenosis) of jejunum were also obtained. Both, tissue and EDTA-plasma were stored frozen at -80°C until determination of Lipid hydroperoxides (LPO), nitric oxide (NO), Cytochrome *c*, Glutathione-S-transferase (GST) and Glutathione peroxidase (GPx) activities.

Results: All colic horses had significantly higher LPO values compared to healthy horses. Horses requiring surgery tended to show higher levels of LPO. By contrary, lower levels of GPx and GST were found in horses requiring surgery. A decrease in GPx and GST activities was observed in the proximal portion of jejunum compared to the distal group. Associated with the decrease of enzyme activities of the glutathione system, a significant decrease in mitochondrial and a significant increase in cytosolic cytochrome *c* was observed in the proximal portion of jejunum when compared with the distal group.

Conclusions: Colic induces harmful effects on intestinal tissue, probably due to an increase in oxidative damage and decrease antioxidant status.

IN VIVO MECHANICS OF TENDON INJURY. SG Dakin, K Jespers, L O'Hara, J Dudhia, AM Wilson, RKW Smith*. The Royal Veterinary College Hertfordshire, UK.

Tendonitis of the superficial digital flexor tendon (SDFT) is a significant cause of injury in equine athletes. This injury results in compromised biomechanical function of the tendon due to fibrotic healing (scarring), which can alter limb compliance (stiffness). The aim of this work was to develop an *in vivo* assessment of tendon mechanics in order to investigate the effect of recent SDFT injury on limb stiffness. This was achieved by performing *in vivo* kinematic assessment and comparing results with *in vitro* mechanical testing of injured and contralateral SDFTs. We hypothesized that: limb stiffness would be reduced as a consequence of injury and then progressively increase throughout the course of tendon healing and that *in vivo* limb stiffness would correlate with the *in vitro* mechanical properties of the SDFT. Kinematic assessment was performed at the walk in 8 horses that had recently sustained severe, career ending SDFT injury and values for limb stiffness derived. Horses were euthanized 6 months after injury and the SDFTs subjected to *in vitro* mechanical testing to determine stiffness of the SDFT. In accordance with our hypotheses, limb stiffness was reduced following SDFT injury and increased with the progression of time. There was a trend for stiffness of the injured limb to approximate that of the contralateral limb by 6 months. Initial data from 6 limbs indicates that there is a strong significant correlation between *in vitro* stiffness of the SDFT and *in vivo* stiffness of the fetlock joint. Thus kinematic assessment may be a useful tool to monitor limb stiffness in horses recovering from tendon injury and the possibility of corroborating *in vivo* limb stiffness to functional tendon repair may permit a more accurate assessment of tendon repair in the horse. Validation of this technique is required using a population of normal horses, however this exciting data suggests that *in vivo* kinematic assessment may be a useful method of assessing the

efficacy of treatment of tendinopathy in future studies without the need for euthanasia.

AGE IS THE MAJOR FACTOR INFLUENCING HORSE CASTRATION COMPLICATION RATES IN A HOSPITAL BASED RETROSPECTIVE STUDY. Hainisch, EK., Schieder, K. Equine Clinic, Veterinary University Vienna, Austria.

Castration is the most commonly performed surgery in the horse. The aim of this study was to identify complication rates associated with three concurrently used methods of closed castration at our clinic. Method 1 used 2 scrotal skin incisions. The wound was then left to heal by second intention. Method 2 was scrotal ablation with primary wound closure. In method 3 castration was performed through inguinal incisions which were also sutured. Between April 2001 and August 2007 649 male horses were castrated of which 480 fulfilled the inclusion criteria (both testes physiologically descended into the scrotum, no abnormalities on palpation, castration the only surgical procedure during the GA). Mean age was 4.17 years. Complications were defined as all abnormal clinical findings on examination apart from mild swelling. No life threatening complications occurred. Overall complication rate was 43.8%. Method 1 had significantly higher complication rate (55.5%) than method 2 (18.6%) and method 3 (20%). Method 3 had too low numbers for further statistical evaluation. Surgery time, surgeon experience and breed had no influence on complication rate. Age however had the greatest influence on complication rate. Whereas horses 2 years and younger had a complication rate of under 20%, complication rates for horses older than 3 years were between 42 and 75%. Primary wound closure protects from wound infection. No horses castrated with method 2 suffered from wound infection or scirrhous cord. This is also reflected in the fact that less antibiotic therapy had to be used in cases with primary wound closure. Conversely primary wound closure had little effect in reducing post operative swelling or fluid accumulation. Significantly more horses castrated with method 1 required surgical intervention to address complications. Most of these interventions consisted of resecting prolapsed connective tissue in the standing horse. General anesthetic was necessary in 4 horses to resect a scirrhous cord. In horses castrated with method 2 the main post operative intervention was re-opening of wounds to allow fluid drainage. In 2 cases however a second general anesthetic was necessary to address post operative hemorrhage. Primary wound closure and castrating horses at a younger age appear to be viable strategies to reduce complication rates in castrating mature horses.

THE TREATMENT OF OLECRANON FRACTURES WITH LOCKING COMPRESSION PLATE (LCP) IN HORSES: A RETROSPECTIVE STUDY OF 16 CASES (2002–2008). MA Jackson, M Kummer*, JA Auer*, R Hagen, AE Fürst*. Equine Department, Vetsuisse Faculty University of Zurich, Switzerland.

Objective: To describe the clinical outcome of 17 olecranon fractures in 16 horses stabilized with LCP. The application of these plates in the equine surgery should allow greater stability and less periosteal disruption. This study aims to test this plates for olecranon fractures and discuss possible complications. It is hypothesized that LCP implants lead to better fracture healing than other implants.

Material and Methods: Medical records of horses with olecranon fracture, which have been treated with LCPs, were reviewed. Data included signalment, history, clinical signs, radiographs, surgical treatment, outcome and complications. Follow-up information was obtained by clinical and radiological examination.

Results: Most of the horses were Warmbloods (11), with a mean age of 11.4 year. 13 of the 17 fractures were simple (type 2), whereas 4 were comminuted (type 4). 5 fractures were open, 12 were closed. Of the 16 horses, 13 were discharged from the hospital. One horse had to be euthanized because of contralateral limb laminitis, one because of implant infection. One horse suffered from a comminuted radius fracture 11 days after fixation of a simple olecranon fracture. The fracture line of the radius ran through the screw of the 11th LCP hole which had been inserted in the lateral cortex of the radius. Other complications included incisional and implant infections (2), synovial fistula (1) and chronic lameness (3). In 1 foal and 5 adult horses the plates had to be removed after healing of the fracture: 2 because of infection, and 3 because of chronic lameness. One of these horses re-fractured the olecranon after removal of the two plates because of a partial non-union. Follow-up was available for all the 13 discharged patients: 12 horses returned to their intended use. One horse was retired and is pasture sound.

Conclusions: The LCP is a valid plate to stabilize olecranon fractures in horses. An accurate positioning of the implant on the caudal aspect of the olecranon is of paramount importance. Implant removal can be necessary: in these cases it is important to rule out other causes of pain, such as infection and non-union.

EVALUATION OF A VESSEL-SEALING DEVICE FOR TRANSCONJUNCTIVAL ENUCLEATION IN THE HORSE. M.T. Launois*, J.M.E.F. Vandeweerd, R.A.R. Perrin*, L. Brogniez, A. Gabriel, F.G. Desbrosse*, L. Brogniez, R. Coomer*. Clinique Equine Desbrosse, Lambert des Bois, France; *Llwyn-Bach Llandissilio, Clynderwen & Cotts Farm Equine Clinic Ltd., Cotts Farm, Robeston Wathen, Narbert Pembrokeshire, UK.

Introduction: Eye enucleation refers to surgical removal of the globe, conjunctiva, nictitating membrane, and lacrimal gland. Two basic approaches have been described, the transpalpebral and transconjunctival technique. Hemorrhage may occur during and after the surgery. In horses, a vessel-sealing device (LigaSure™, Valleylab, Boulder, CO) has been evaluated and appeared to be a safe method for hemostasis of the ovarian vasculature and for hemostasis of the mesenteric vasculature during resection of normal small intestine. In this study, we describe the use of the LigaSure for transconjunctival enucleation and its application in 12 horses with eye pathology.

Material and Methods: The medical records of all horses undergoing transconjunctival enucleation using feedback-controlled bipolar vessel sealing device (LigaSure) in our clinic between April 2005 and October 2008 were reviewed.

Results: No perioperative hemorrhage occurred in all surgeries. In all horses, no bleeding occurred in the postoperative period, minimal to no swelling was seen five days after surgery at the bandage change and no discharge was present. One horse developed pyrexia and leukocytosis at day three and four, but there was no sign of infection of the surgical site and this horse responded very well to administration of penicillin. None of the horses had signs of incisional problems, and no local inflammation was seen or reported after suture removal. None of the horses developed blindness in the contralateral eye from trauma to the optic nerve. One horse became blind from the other eye but this was due to a glaucoma present before the surgery. It was euthanized. All other horses returned to normal life.

Discussion: The vessel sealing device was easy to use though frequent cleaning of the jaws was necessary to maintain good function during the surgery. The results of this case series indicate that reliable vessel sealing was achieved in all horses and very few complications were encountered after transconjunctival enucleation using the LigaSure.

EFFECT OF BIPOLAR RADIOFREQUENCY ENERGY WITH CONDUCTIVE FLUID ON INCISIONAL HEALING. Menendez MI, Ishihara A, Weisbrode S, Bertone AL*. College of Veterinary Medicine, The Ohio State University, Columbus, OH.

Introduction: Bipolar Radiofrequency Energy (RFE) is being launched for hemostasis in orthopedic joint replacements. RFE also potentially contracts collagen in dense connective tissue. Our goal was to measure skin incision and joint capsule contraction, hemostasis and safety varying RFE fluence (watts.sec/cm²).

Materials and Methods: Five mature sheep had six intercostal space 2.5 cm² skin incisions made and assigned to treatment using the bipolar RFE device at varying fluence of 190f (170 W, 2.8 sec), 380f (170 W, 5.6 sec) or 570f (170 W, 8.4 sec) with a conductive fluid flow rate of 10 ml/min and healing assessed for 2 weeks. Femorotibial joint capsule (2 cm²) was untreated or treated ex vivo with similar fluence. Outcome assessment included % hemostasis, % contraction, incisional swelling, pain and drainage, healing score, and histomorphology at 2 weeks.

Results: Hemostasis was >84% for all fluences. Incision and joint capsule contraction increased with fluence (P<0.05). The 190f incisions all healed. The 570f incisions healed with transcollation and desiccation of the surface, with greater inflammation, necrosis and granulation repair tissue than 190f and 380f. Joint capsule deformation was dose dependent and included surface shrinkage without reduction in volume.

Discussion/Conclusion: Our study demonstrated that 190f RFE can be used on skin and joint capsule to effectively induce wound and tissue contraction (~30%) and hemostasis (>80%) without impairing skin incisional healing. At 570f, RFE produced dramatic (>80%) wound contraction and hemostasis, however, the surgeon should expect greater incisional swelling, necrosis and a firm desiccated surface.

SAFETY OF FUCOIDAN SOLUTION IN HORSES: PATHOLOGY FINDINGS. Morello S[†], Southwood LL*[†], Engles J[†], Crack A^{††}, Springate CMK^{††},
[†]University of Pennsylvania, Kennett Square, PA; ARC Pharmaceuticals Inc.,
^{††}Vancouver, British Columbia, Canada.

Introduction: Postoperative intra-abdominal adhesions are a common, sometimes life-threatening complication following abdominal surgery in horses. Fucoidan solution has been shown to prevent adhesions in several animal models. However, to the best of our knowledge no fucoidan safety studies have been performed in the horse. The purpose of the current study

was to evaluate the pathology-related safety of fucoidan solution in horses. Our hypothesis was that following abdominal surgery in adult horses the intraperitoneal administration of fucoidan solution would not influence healing or inflammation.

Materials and Methods: Healthy horses were entered into a block randomized, blinded study to compare fucoidan solution (n=6) with Lactated Ringer's Injection USP (control LRS) (n=6). Horses underwent a jejunojunostomy at 2 sites and immediately before final suture 5L of fucoidan solution or control LRS were administered intraperitoneally. A necropsy was performed at day 10. Anastomosis healing was examined by determining the bursting pressure and bursting wall tension and by histology. Incision healing was characterized by measuring mechanical tension required for failure and by histology. Inflammation of anastomosis and incision sites was investigated by histology.

Results: No differences were observed between treatment groups for incisional load to failure, intestinal bursting wall tension, or histological samples. Fucoidan solution treated horses had a higher intestinal bursting pressure compared to horses in the LRS group (262 ± 52 versus 206 ± 12 mmHg, p=0.03).

Conclusion: Fucoidan solution was safely administered intraperitoneally during celiotomy and anastomosis in horses; and we speculate that fucoidan solution may have improved anastomosis healing. Fucoidan solution appears to act primarily as a physical barrier between damaged peritoneal tissues and may be appropriate for use in horses during abdominal surgery.

MARKERS OF OSTEOGENESIS AND OSTEOCLASTIC ACTIVITY ARE ALTERED IN THE ARTHROSCOPIC REMOVAL OF FRACTURES OF THE LATERAL MALLEOLUS OF THE TIBIA IN THE TARSO-CRURAL JOINT. O'Neill, H.D., Bladon, B.M.* Donnington Grove Veterinary Surgery, Newbury, UK.

Introduction: Fractures involving the lateral malleolus of the tibia are an infrequently encountered condition of the tarsocrural joint. They are typically an avulsion fracture of the lateral collateral ligaments of the tarsocrural joint, often caused by a fall. Affected horses usually present with a moderate lameness and effusion of the hock. Radiography is diagnostic. Traditional approaches to the management of such fractures include conservative management (Jakovljevic *et al* 1982) and the surgical fragment removal via arthrotomy (Wright 1992). The results are good, with 5/5 horses managed conservatively returning to work and 13/16 horses managed by arthrotomy returning to athletic use.

Materials and Methods: We report a retrospective study of 12 horses treated by arthroscopic removal of the fracture fragments. All horses underwent arthroscopic examination of the tarsocrural joint under general anesthesia. The fracture plane was only obvious in one horse and soft tissue dissection was necessary to identify the fracture in the remaining cases. All the fragments were dissected from the extensive soft tissue attachments of the lateral collateral ligaments using a radiofrequency probe. Most fragments were also reduced in size using a motorized burr. The underlying soft tissues were further debrided using a motorized retractor.

Results: Twelve horses presented over a 9 year period (1999–2008). Eleven were Thoroughbreds, ten of which were National Hunt racehorses and one was a flat racehorse. The other horse in the study was used for general purpose riding. In 7 horses lameness was associated with a fall.

One horse required a second anesthetic when post operative radiographs revealed a fragment left in the subcutaneous tissues. There were no other intra-operative complications. Of 11 horses with >6 months follow up, all are sound. Of the 10 racehorses, 9 have raced again, a total of 85 times (median 5 times). The median time from surgery to return to racing was 240 days (180–366 days).

Discussion: We conclude that arthroscopic surgery for lateral malleolus fractures is a justified alternative, offering many advantages over arthrotomy including more rapid return to exercise and more complete examination of the joint. The prognosis is apparently very good.

HOW ACCURATE IS A PRESSURE PLATE AS A CLINICAL TOOL TO QUANTIFY EQUINE GAIT SYMMETRY? Oosterlinck M¹, Pille F*¹, Huppes T², Gasthuys F¹, Back W*^{1,2}. ¹Ghent University, Merelbeke, Belgium; ²Utrecht University, Utrecht, The Netherlands..

Introduction: The use of the traditional force plates, the 'gold standard' in equine quantitative gait evaluation, is mainly limited to experimental settings, whereas modern pressure plates could provide a valuable alternative in a more clinical setting. A practical application in the evaluation of equine limb-load asymmetry in lameness examination can be foreseen when variables determined from a stand-alone pressure plate in the present study could be used interchangeably to force plate measurements.

Materials and Methods: Six sound Dutch Warmblood horses (mean \pm SD age 6 ± 4 years, bodyweight 592 ± 82 kg and height 1.59 ± 0.07 m) were walked and trotted over a combined pressure plate (PP; Footscan 3D 1m-system, RsScan International, Belgium) and force plate (FP; Z4852C, Kistler, Switzerland) system. A trial was considered valid if a complete hoof print of one forelimb was recorded, while velocity was within a preset range. For each set of 5 valid trials of both forelimbs, simultaneously collected FP and PP limb-load and timing data (mean Peak Vertical Force (PVF), Vertical Impulse (VI), stance phase duration (ST), time at which the PVF occurs (tPVF) and forelimb symmetry ratios (SymPVF and SymVI) were compared. A Mixed Model Analysis of Variance and Pearson's Correlation coefficient were used to evaluate differences between FP and PP data, with statistical significance set at $P < 0.05$.

Results: Significant differences between FP and PP were seen for PVF, tPVF, VI, SymPVF and SymVI, but not for ST. Significant correlation was found for ST and tPVF.

Conclusion: Although the differences in symmetry ratios between PP and FP at trot are significant, they appear negligible compared to the degree of asymmetry associated with clinical lameness. As such, this pressure plate can be useful for evaluating timing variables and load-symmetry ratios at trot in a clinical setting, although it cannot be used interchangeably to a force plate for measuring absolute values of limb loading. Nevertheless, it has important advantages in terms of practicality to unravel the load-distribution of the different portions of the hoof during a complete stance phase. With these advantages, it is tempting to explore the use of this equipment in the near future to quantify equine lameness in a clinical setting.

UNILATERAL AND BILATERAL OVARIECTOMY IN 126 MARES: A RETROSPECTIVE STUDY COMPARING CONVENTIONAL AND LAPAROSCOPIC SURGICAL TECHNIQUES. Röcken M.^{1,2}, Mosel G.¹, Litzke L.-F.², Seyrek Intas K.³ ¹Tierklinik Starnberg Germany, ²Klinik für Pferde, Chirurgie, JLU-Gießen Germany, ³Veteriner Fakültesi Klinikleri Bursa Turkey.

Objective: The aim of this retrospective study was to evaluate surgical technique, intra- and postoperative complications and outcome of conventional surgical techniques compared to laparoscopic surgery for unilateral and bilateral ovariectomy.

Methods: 126 clinical patients were included, in which 173 ovariectomies had been performed. 21 horses underwent a conventional surgery either in dorsal recumbency through a midline incision ($n = 11$) or by colpotomy ($n = 10$). In the first group dissection and hemostasis was achieved by TA 90 stapling device and circular ligature and in the second group by using a chain écraseur. 105 mares underwent a standard laparoscopic procedure for ovariectomy in the standing sedated horse. In four of these cases after dissection, the big-sized ovarian tumor was extracted by a midline celiotomy. Outcome and complications of each method were recorded and analyzed.

Results: In the first group four of eleven (36,4%) and in the second group two of ten patients (20%) developed serious postoperative complications like hemorrhage, adhesions and septic peritonitis. Three of these horses finally had to be euthanized or died. In this study patients with conventional surgery had a postoperative morbidity rate of 28,6% and a mortality rate of 13,6%. In the group of laparoscopic ovariectomies 12 mares (8,4%) developed postoperative complications in kind of incisional infection, seroma formation, elevated temperature and mild abdominal discomfort. In all mares with incisional problems in the flank the ovarian size was greater than 12 to 15 cm. All horses responded to conservative treatment.

Conclusion and Clinical Relevance: This study shows that the laparoscopic technique in the standing sedated horse can be performed safely and reliably for removal of normal and pathologically enlarged ovaries. To avoid incisional complications big-sized ovaries should be exteriorized after size reduction by using a specimen bag or removing the ovary by midline incision. Based on these results the conventional surgery should only be used for cases where the laparoscopic approach is not possible.

MICROARCHITECTURE ANALYSIS OF THE DISTAL THIRD METACARPAL SUBCHONDRAL BONE IN RACING THOROUGHBREDS. Rubio-Martínez LM, Cruz AM*, Inglis D, Hurtig M*. Ontario Veterinary College, University of Guelph, Canada.

Introduction: Variation in subchondral bone (SCB) microarchitecture at the distopalmar metacarpal condyles may contribute to the pathogenesis of condylar fractures in racing thoroughbreds. We hypothesized that principal trabecular orientation and degree of anisotropy (DA) of the SCB vary between condyles vs. sagittal ridge, subchondral bone plate (SCBP) vs. trabecular bone (TBB), and between stages of SCB disease.

Material and Methods: Twenty-four thoroughbred third metacarpi were partitioned into 2 equal groups (Mild and Severe) according to severity as evidenced by microcomputed tomography (μ CT) of the distopalmar SCB of the metacarpal condyles. Samples of subchondral (SCBP) and trabecular bone (TBB) were collected from both condyles and the sagittal ridge, and imaged. The angle (θ) defining the principal orientation of trabeculae and the degree of anisotropy (DA) were calculated for each sample using a 3D stereologic analysis. A partial randomized block ANOVA was performed with significance set at $p \leq 0.05$.

Results: Condylar samples had lower angle (8.9° [7.3–10.9]) than sagittal ridge samples (40.7° [33.6–49.2]; $p < .0001$). TBB had higher anisotropy DA (1.75 ± 0.04) than SCBP (1.29 ± 0.04 ; $p \leq .0052$). Mild TBB had higher DA (1.85 ± 0.06) than severe TBB (1.65 ± 0.06 ; $p = 0.051$).

Discussion/Conclusion: The highly ordered appearance of trabeculae within the condyles supports that joint loading is primarily transmitted through the condyles and not the sagittal ridge. Sharp changes in the trajectories of the SCB functional loads with hypothetical tensile forces at the condylar grooves might contribute to the pathogenesis of condylar fractures. Normally, SCBP appears more isotropic than TBB; however, in advanced stages of SCB disease TBB becomes more isotropic, likely as a result of an adaptive process.

VARIABILITY OF RESTING ENDOSCOPIC GRADING FOR ASSESSMENT OF LARYNGEAL FUNCTION IN HORSES. R.O. Salz, J.D. Perkins*, J. Schumacher*, L. Livesey†, R. Piercy, S. Z. Barakzai*†, Royal Veterinary College, North Mymms, Hertfordshire, U.K.†Faculty of Veterinary Medicine, Royal (Dick) School of Veterinary Studies, Midlothian, U.K. †Auburn University, Auburn, Alabama, U.S.A.

Introduction: The variability of endoscopic grading of arytenoid cartilage movement is uncertain. The purpose of this study was to determine the observer and horse variability of grading arytenoid cartilage movement in horses during resting endoscopic examination, using a seven-grade system.

Materials and Methods: Endoscopic recordings of the upper respiratory tract made at rest in 270 draft horses were reviewed independently by two veterinarians to assess interobserver variability. Laryngeal function was assessed subjectively using a seven-grade system. Grading was repeated by both examiners in 80 randomly selected recordings in order to assess intra-observer variability. In 120 horses, endoscopic recordings were repeated after 24–48 hours, and these were graded by both veterinarians to assess intra-horse variability.

Results: The mean weighted κ statistic for concordance within examiners was 0.867, with a mean intraobserver agreement of 76.3%. The weighted κ statistic for concordance between the two examiners was 0.765, with an interobserver agreement of 63.1%. Of the horses receiving two endoscopic examinations, the same grade was assigned to 41.7% of horses at the second examination. The mean weighted κ statistic for concordance between the grade assigned at first vs. second examinations was 0.588, indicating only moderate agreement.

Discussion/Conclusion: Intraobserver and interobserver reliability of resting endoscopic grading of arytenoid cartilage movement using a seven-grade system was high when examinations were conducted by experienced veterinarians. However there was moderate daily intrahorse variability, suggesting that results of resting endoscopic examinations performed on a single day should be interpreted with caution, particularly when making decisions on the assessment of horses at the time of sale.

IMPROVED IDENTIFICATION OF THE PALMAR FIBROCARILAGE OF THE NAVICULAR BONE WITH SALINE MAGNETIC RESONANCE ARTHROGRAPHY. Schramme M*, Kerekes Z, Pease A, Hunter S., North Carolina State University, Raleigh, NC.

Introduction: Degeneration of the palmar fibrocartilage of the navicular bone is the earliest and most common pathological finding in horses with navicular disease (wright *et al.* 1998; Schramme *et al.* 2005). It remains difficult to detect degeneration of the navicular fibrocartilage even with mri (Widmer 2000). We hypothesized that the injection of the navicular bursa with saline prior to mri, would result in improved accuracy in evaluation of the palmar fibrocartilage of the navicular bone.

Materials and Methods: Thoracic limbs were collected from 11 horses within 6 hours of death. Imaging was performed with a 1.5 tesla high field magnet (Siemens Symphony) using a sagittal 2 d pd and transverse 3 d fs flash sequence, both before and after injection of the navicular bursa with 6–10 cc 0.9% saline. Navicular bones were removed and examined grossly before and after staining with Indian ink. Sagittal sections of each navicular bone were decalcified and stained with hematoxylin and eosin. For the purpose of determining sensitivity and specificity of MRI, the fibrocartilage layer of each navicular bone was classified as normal or abnormal, based on combination of the findings of gross and microscopic pathology. The MR

images were evaluated blindly. Sensitivity, specificity, accuracy, positive and negative predictive values were calculated for each image sequence. Thickness of the fibrocartilage layer was measured on histological sections and corresponding transverse flash MR images before and after injection of contrast. MR and histological thickness measurements were compared using a Wilcoxon assigned rank test and Spearman's rank correlation coefficient.

Results: Fibrocartilage abnormalities were present in 6 of 22 limbs. Sensitivity of plain MRI for detection of fibrocartilage lesions was 100% but the specificity was only 6%. Consequently the false positive rate was 94%, while the false negative rate was 0. Using saline MR arthrography, both sensitivity and specificity were graded as 100%, and both the false positive and false negative rates were 0. The transverse flash sequence used after injection of the navicular bursa with saline, was the most sensitive, specific and accurate technique for detection of fibrocartilage loss from the palmar surface of the navicular bone. The mean histological fibrocartilage thickness was 0.76 ± 0.14 mm. On postcontrast MR images, mean fibrocartilage thickness was measured as 0.95 ± 0.09 mm. A Wilcoxon signed rank test revealed a significant difference between histological and MRI measurements ($p < 0.001$). MRI overestimated the thickness of fibrocartilage compared to histology. Spearman's rank correlation coefficient between histological and MRI measurements of fibrocartilage ($r = 0.08$) indicated that both data sets were not correlated ($p = 0.88$).

Discussion: This study suggests that there are two distinct fibrocartilage layers in the navicular bursa, one on the palmar surface of the navicular bone and another one on the dorsal surface of the ddf. It further shows that the palmar fibrocartilage of the navicular bone can only be evaluated after intrabursal injection of saline contrast. Moreover, it must be recognized that MRI evaluation of partial thickness fibrocartilage lesions of the navicular bone is unreliable without injection of a T1 hypointense contrast like saline into the navicular bursa.

SENSITIVITY AND SPECIFICITY OF HIGH FIELD AND LOW FIELD STANDING MRI FOR DETECTION OF CARTILAGINOUS AND OSSEOUS LESIONS OF THE EQUINE FETLOCK JOINT. Smith MA*, Dyson SJ, Murray RC*. Animal Health Trust, Kentford, Newmarket, UK.

Introduction: Pulse sequences used clinically for lameness diagnosis in a standing 0.27 tesla (t) magnetic resonance imaging (MRI) system have different imaging parameters compared with MRI under general anaesthesia using high field imaging. It has been suggested that small cartilage defects and lesions within weight bearing aspects of joints may be less easily identified using a standing system. We hypothesised that

1. Sensitivity and specificity of 1.5t and 0.27t MRI would be comparable for detection of lesions within the subchondral bone of the fetlock joint.
2. Sensitivity and specificity of 1.5t MRI would be greater than 0.27t MRI for detection of cartilaginous lesions within the fetlock joint.

Materials and Methods: 19 cadaver distal limbs from horses with lameness localised to the fetlock region prior to euthanasia were imaged in 0.27t and 1.5t MRI systems, positioned to simulate standing and recumbant. Limbs were dissected and histology of the fetlock osteochondral tissues performed. Cartilage, subchondral and trabecular bone and mr images (e-film software) were graded using predetermined definitions. Sensitivity and specificity were calculated using histopathology as the gold standard.

Results: For the detection of mild cartilage lesions, 1.5t t2* gradient echo (gre) and 0.27t t2 fast spin echo (fse) sequences were most sensitive (100%) but less specific (12.6%) while 1.5t t1 gre, 0.27t t1 gre and 0.27t t2* gre sequences had lower sensitivity (36%–45%) but higher specificity (66%–80%). Similar results were obtained for moderate and severe cartilage lesions. For all sequences analysed, high sensitivity (95%–100%) but low specificity (2%–38%) for detection of lesions within the subchondral bone of the mcp/mtp joint were determined. Specificities were higher for 0.27t sequences compared with 1.5t sequences. All pulse sequences had higher sensitivity (43%–70%) and specificity (64%–100%) for detection of lesions within trabecular bone.

Conclusions: For all sequences used, detection of subchondral bone lesions was comparable between MRI systems, supporting hypothesis 1. Using specific sequences (1.5t t2* gre and 0.27t t2 fse), detection of cartilage lesions was comparable between MRI systems, refuting hypothesis 2 and indicating that a combination of sequences is essential for diagnosis of cartilage lesions.

SUCCESSFUL TREATMENT OF EQUINE SARCOIDS BY USING ACYCLOVIR. Stadler, S.¹, Haralambus, R.^{2,4}, Brehm, W.³, Hainisch, E.K.⁴, and Brandt, S.⁵ ¹Pferdekl. Tillysburg, St. Florian, Austria; ²Equine Clinic, Vetsuisse Faculty, Berne, Switzerland; ³Faculty of Veterinary Medicine, Leipzig, Germany; ^{4,5}Clinic of Equine Surgery, Veterinary University, Vienna, Austria.

Equine sarcoids are non-invasive, yet locally aggressive skin tumors affecting up to 8% of the worldwide equid population. Sarcoids are classified as

occult, verrucous, nodular, fibroblastic, mixed or malevolent types of lesion, according to their clinical appearance, with occult or verrucous tumors representing milder tumor stages. Today, it is widely accepted that bovine papilloma viruses of types 1 and 2 (BPV-1, BPV-2) contribute to sarcoid disease initiation and maintenance. No universally effective method to cure this therapy-resistant and often recrudescing tumor type is available so far. Based on the anecdotally reported eradication of a sarcoid by using acyclovir (Zovirax[®]) cream, we investigated the efficacy of its antiviral compound, acyclovir, in a cohort of 30 sarcoid-affected horses. Twenty-nine sarcoid patients presenting with single or multiple occult, verrucous or nodular lesions were treated daily by topical application of acyclovir 5% cream for a period of two to six months. In one case of mixed (right hind fetlock) or occult sarcoids (left hind fetlock) affecting a mare, acyclovir therapy was combined with cidofovir treatment. Clinical examination of every patient was performed on day 0 and then in two weeks-intervals for up to 6 months. Interestingly, 100% of investigated lesions responded to acyclovir treatment, with complete tumor regression observed for 65% of sarcoids and no recurrences reported so far (Fig. 1). Incomplete resolution was observed for 35% of lesions. The latter represented tumors that penetrated more deeply, thus suggesting that the cream could not penetrate the entire lesion. Acyclovir acts to specifically inhibit the replication of herpes viruses following its activation by viral thymidine kinase (TK). Given that papilloma viruses lack this enzyme, the mechanism by which acyclovir acts on BPV-1/2-induced sarcoids remains unclear. Yet, acyclovir represents a simple, cheap and well-tolerated agent for successful treatment of milder sarcoid types and use as adjuvant therapeutic agent.

LAPAROSCOPICALLY ASSISTED HYSTERECTOMY IN 3 MARES WITH PYOMETRA. N.S. Woodford*, R.J. Payne#. University of Bristol, Langford and #Beaufort Cottage Equine Hospital, Newmarket, United Kingdom.

Introduction: Ovariohysterectomy in the mare has traditionally been performed via a ventral midline incision. This provides limited visualization and a long surgical incision. Post-operative complications are common and life-threatening. Laparoscopically assisted hysterectomy has been performed by the authors in 3 mares with pyometra.

Materials and Methods: 3 mares diagnosed with pyometra were referred for hysterectomy. Uterine irrigation was performed before surgery. Mares were starved for 36 hours preoperatively. The mares were placed in stocks and sedated. The surgical approach was initiated by a standing left flank laparoscopy using well established principles. Local infiltration with mepivacaine was used to desensitize the 3 portal sites. A needle was introduced and mepivacaine was injected into mesovarium and mesometrium. The dorsoventral plane of left lateral ligament of the bladder demarcated the caudal extent of the required desensitization. A 10 mm vessel sealing device (Ligasure[®] atlas forceps) was introduced through the most dorsal portal and used to dissect the mesometrium/mesovarium to the caudal limit described. Skin incisions were closed with nylon. This was repeated on the right side.

The horse was then transported to the surgery for induction of general anesthesia and placed in dorsal recumbency. After routine preparation a 12 cm caudal midline skin incision was made. The uterus was exteriorized and a TA-90 stapler placed distally across the uterine body. An ILA-100 stapler was placed parallel to the TA-90 and just proximally. The ILA-100 was fired and the uterus removed. The remaining uterine tissue was oversewn with 4 metric Biosyn[®] using a continuous Cushing inverting suture. The linea alba, subcutaneous tissues and skin were closed routinely.

Results: Surgery was successful in all 3 mares. The Ligasure vessel sealing device provided effective hemostasis in all 3 mares. In case 2 the mesocolon was inadvertently engaged in the Ligasure forceps during activation and a small focal petechiation was observed. This did not produce any further complications.

All mares were very bright and alert the next day with good appetite. No incisional swelling was observed. In cases 1 & 2, 5 cm of uterine stump remained as determined by transrectal ultrasound. No bacteria were cultured from case 1 but in case 2 *Aspergillus fumigatus* was obtained. A 2.5% solution of emiconazole was used to lavage the uterine stump for several days.

Clinical Relevance: This two stage technique represents an improvement on traditional single-stage open surgical hysterectomy in terms of technical ease, post-operative recovery and lack of complications.

Large Animal Resident Presentations

SURGICAL TREATMENT OF DIGITAL SHEATH SYNOVIAL GANGLIA. Crawford A., Crowe O.[†], Eliashar E.,* Smith R.K.*[†]. Willesley Equine Clinic Ltd, Byams Farm, Willesley, Tetbury. Department of Veterinary Clinical Sciences, Royal Veterinary College, Hatfield, UK.

Introduction: Synovial ganglion cysts associated with the digital flexor tendon sheath (DFTS) in horses are an uncommon cause of lameness. This

retrospective review of cases was undertaken to determine the optimum method of diagnosis and to assess the response of surgical treatment.

Methods: The medical records of nine horses presenting with synovial ganglion cysts of the DFTS were reviewed and the clinical features, diagnostic methods, treatment and outcome were reported.

Results: Seven of 9 horses were heavy breed types. Seven of the 9 had lameness attributed to the ganglion cyst. All lame horses had a history of chronic lameness ranging from 1 to 10 months (mean 9m) prior to presentation. Diagnostic analgesia was performed on all lame horses and 6 of 7 (86%) of these had a positive response to analgesia of the DFTS. An ultrasonographic examination of the region was performed in all 9 horses and identified communication between the ganglia and the DFTS in all cases (100%). Seven horses underwent surgical resection of the ganglion, during which identification of a tract between the DFTS and the ganglia was identified. Five of these underwent concurrent tenoscopy of the affected DFTS, and in three of these additional lesions were identified including disrupted fibres of the distal oblique sesamoidean ligament in one, a deep digital flexor tendon tear in another and a *manica flexoria* tear in the third horse. Surgery resulted in complete resolution of signs in 6 of 7 horses (86%); (range of follow-up; 6 months to 6 years, mean; 31 months). Histopathology was performed in 6 of 7 surgical cases and did not identify a synovial lining within the ganglion cysts in any case.

Discussion: Synovial ganglia appear to arise from disruption of the fibrous wall of the digital sheath associated with chronic irritation. We believe that synovial ganglia can be a cause of lameness, possibly associated with high pressures within the ganglion itself and/or inflammation of surrounding structures. Surgical resection carries a good prognosis for soundness; although combined tenoscopic examination of the sheath is recommended in chronic traumatic cases.

ARE FRACTURES OF THE PROXIMAL SESAMOID BONES IN THE THOROUGHBRED RACEHORSE A BONE FATIGUE RELATED FRACTURE? A HISTOLOGICAL STUDY. M. Kristoffersen, U. Hetzel, and E.R. Singer*. Dept. Veterinary Clinical Studies, Liverpool University, The United Kingdom.

Aim: The aims of the current study are to investigate if fatigue damage by microfractures and changes in the bone density area are associated with biaxial proximal sesamoid bone fractures (PSBF).

Material and Methods: Proximal sesamoid bones from 10 Thoroughbred racehorses with PSBF of the front limbs and 10 control racehorses were stained using the en bloc basic fuchsin staining method. Sagittal sections of each proximal sesamoid bone were examined blindly for microfractures by direct transmitted light and epifluorescent light microscopy at 100 × and 200 × magnification. Bone histomorphometric analysis was carried out at 40 × magnification using transmitted light microscopy. Comparison of the density of microfractures and bone morphometry using two sample t-test, paired t-test and Mann-Whitney U test with a significance level of $P < 0.05$ were carried out between controls, non-fractured case bones and fracture bones.

Results: There was no significant difference in the density of microfractures, the bone surface area and bone surface area proportion between bones from case and control horses, and between fractured and non fractured bones in case horses. There was no significant difference between left and right, and medial and lateral bones in the control and non-fractured case bone groups.

Discussion: The density of microfractures was not significantly different between cases and controls, this indicates that propagation of microcracks into fatigue fractures is an unlikely etiology in PSBF in the British racehorse. There was no significant difference in the bone surface area between cases and controls which one would expect if modeling, adaptation and an increase in bone density were associated with fracture in the case horses.

Conclusion: The results indicate that PSBF in the British racing population may be a result of an acute fracture without underlying microdamage, rather than a result of non-adaptive bone remodeling which is the cause of other common fractures in the racehorse.

INCISIONAL COMPLICATIONS FOLLOWING EXPLORATORY CELIOTOMY IN HORSES; DO SKIN STAPLES INCREASE THE RISK?. Levet T.¹, Torfs S.², Martens A.^{*1}, Dewulf J.³, Deprez P.² ¹Department of Surgery and Anaesthesiology of Domestic Animals;²Department of Large Animal Internal Medicine;³Department of Reproduction and Herd Health, Ghent University, Belgium.

Introduction: Since the rate of post operative survival has improved, surgical site complications following exploratory celiotomy are coming under increased scrutiny. A large-sized retrospective study was performed in order to determine intrinsic and extrinsic risk factors for celiotomy incisional infection and to compare staples versus conventional sutures for skin closure of celiotomy wounds.

Materials and Methods: All horses that had one celiotomy and had survived >2 weeks after surgery from March 2004 to December 2007 were included.

Wounds were classified as "normal" (no wound complication, only edema, serous drainage lasting <24 hours after surgery) or as "draining wound" (purulent drainage with or without positive bacterial culturing or persistent serosanguinous). Several intrinsic and extrinsic factors including the method of skin closure (conventional suture in a continuous pattern or stainless-steel staples) were considered in a multivariable logistic regression analysis.

Results: Of the 356 horses, 303 (85.1%) had normal wound healing and 53 (14.9%) had a draining wound (purulent : 48 (13.5%), persistent serosanguinous: 5 (1.4%)). Bacteriological culture was positive in 33/40 cases (mainly *S. aureus* (12 including 4 MRSA) and *E. coli* (8)). Factors significantly associated with wound drainage in the multivariable analysis were: the use of staples for skin closure (OR: 3.50, $P < 0.001$), whether the surgeon closing the surgical site was a 1st or 2nd year resident versus more experienced surgeons (OR: 2.61, $P = 0.005$) and if the surgery was performed in the winter season. Lavage of the linea alba with sterile saline after closure was a protective factor (OR: 0.36, $P = 0.003$).

Conclusion: In conclusion, despite their ease and speed of application, skin staples can lead to an increase in celiotomy wound complications in horses.

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN RACE PERFORMANCE AND SUPERFICIAL DIGITAL FLEXOR TENDONITIS IN THE THOROUGHBRED RACEHORSE. O'Meara, B.^{†§}, Bladon B.^{§*}, Parkin T.D.[‡], Fraser, B.^{§*} Lischer C.J.^{†*}, [†]Faculty of Veterinary Medicine, University of Glasgow, Scotland; [‡]Donnington Grove Veterinary Surgery, Oxford Road, Newbury, England.

Objective: To compare the racing performance of Thoroughbred racehorses which sustain superficial digital flexor tendonitis to the performance of matched control horses, and to assess the proportion of horses which sustain a re-injury. The following hypotheses were investigated:

(1) Case horses were near their maximum pre-injury performance level in the race before injury; (2) Case horses showed a decrease in maximum performance post injury; (3) Case horses were less likely to return to racing and to complete three or five races post injury.

Study Design: Medical information and racing histories of 401 racehorses with a first occurrence of a SDF tendonitis were acquired. The horses were treated at Donnington Grove Veterinary Surgery with intra-lesional Insulin-like growth factor (type 1), traditional bar firing or by superior check ligament desmotomy. One sex, age and training establishment matched control horse was selected per case horse.

Results: (1) The difference in Racing Post Rating_(max) and the Racing Post Rating in the race immediately before the treatment date was significant smaller in case horses (9.6lbs; range = 0–75) compared to control horses (17.0lbs; range = 0–79) (P -value < 0.001). (2) No significant decrease in performance was noted post injury. (3) No difference was found for return to racing and racing three times, but case horses were significantly less likely to complete 5 races post injury date than control horses. Eighty percent returned to racing, and the re-injury proportion within three years of treatment was 53%.

Conclusion: Injury was associated with an individual's pre-injury maximum performance level. The study suggests that return to racing and completion of three races is not a useful indicator of successful treatment of SDF tendonitis.

Clinical Relevance: Measurement of success for treatment of SDF Tendonitis should include a minimum of five races post injury and the re-injury proportion within three years of treatment.

DYNAMIC RESPIRATORY ENDOSCOPY IN 67 THOROUGHBRED RACEHORSES TRAINING UNDER NORMAL EXERCISE CONDITIONS. Reardon R.J.M., Pollock, P.J.^{*}, Parkin, T., Johnston, M.J., Tate, J., Love, S. University of Glasgow, Scotland, GB.

Reasons for Performing the Study: A wireless videoendoscope has recently become available on the equine market. To date there is only one published report of the findings from this technique in a small mixed population of horses, without measurement of horse speed.

Objectives: To report the findings of wireless videoendoscopic imaging of Thoroughbred horses during standard ridden training conditions with or without history of respiratory disease.

Hypotheses: The Dynamic Respiratory Scope (DRS) system will allow identification of pathology of the upper portion of the respiratory tract (URT) during ridden exercise. Pathological conditions of the URT will lead to ridden speed reduction.

Methods: Horses were randomly selected from a population of Thoroughbred horses in training at the same yard. Endoscopic images of the

URT were recorded during a ridden exercise test on an "all weather gallop". Test variables including speed, rider and tack weight and weather conditions were recorded. Endoscopic images were reviewed post testing and the results compared with the other test variables.

Results: A total of 67 (34%) of the 195 horses in training in the yard were examined on a single occasion. Endoscopic findings included: Normal laryngeal/pharyngeal function (44 cases), dorsal displacement of the soft palate (DDSP) (13 cases), laryngeal asymmetry (4 cases), axial deviation of the aryepiglottic folds (3 cases), laryngeal collapse (2 cases) and a mucosal kissing lesion on the left arytenoid (1 case). Maximum speed obtained by horses on the gallop ranged from 41.8 to 56.3 kph. DDSP resulted in speed reduction in 8 cases and no change in speed in 2 cases. Images of diagnostic quality were obtained in all horses. Complications included minor nasal discharge, snorting and minor technical difficulties with the equipment.

Conclusions: The DRS provides a safe, effective system for imaging the equine URT during ridden exercise at speed. The abnormalities of the URT identified were similar to those of Thoroughbred racehorses observed during treadmill endoscopy studies reported in the literature. The effect of URT abnormalities on ridden speed requires further investigation. The DRS is likely to have substantial implications for future clinical diagnosis and treatment of URT pathology in horses.

MANAGEMENT, OUTCOME AND RADIOGRAPHIC ASSESSMENT OF THE DEVELOPMENT OF OSTEOARTHRITIS IN 17 HORSES WITH METACARPALALGAE OR METATARSOPHALANGEAL JOINT LUXATION. ¹E. Rebsamen, ¹A. Fürst*, ²R. Hagen, ³K. Kalchofner Guerrero¹, M. Kummer*. ¹Equine Department, Section of Surgery ²Radiology Department, ³Equine Department, Section of Anesthesiology, Vestuisse-Faculty University Zürich, Zürich, Switzerland.

Introduction: In this study, the development of osteoarthritis (OA) and the long-term outcome after collateral ligament (CL) rupture in both open and closed fetlock luxations was evaluated. Our hypothesis was, that closed MCP/MTP joint luxations had a better long-term prognosis than open luxations.

Material and Methods: Horses were included in the study on the basis of radiographic evidence of subluxation or luxation in stressed MCP/MTP joints in the dorsopalmar/dorsoplantar (DP) view (Tenney and Whitcomb 2008). Horses were clinically and radiographically evaluated at first presentation in the clinic as well as at follow-up examination.

Results: Seventeen horses met the inclusion criteria. Four front limbs and 13 hind limbs were affected. Lameness varied between 2/5 to non-weight bearing lameness. Four horses presented with a clinically obvious luxation. Radiographic evaluations at initial presentation in the clinic showed on stress views of the fetlock luxation (n=6) or subluxation (n=11) of the MCP/MTP joint. Fifteen of 17 horses were treated for their injuries. In 11 horses a closed fetlock luxation was diagnosed. Six of these horses were treated conservatively, 5 were treated surgically. In 4 horses open MCP/MTP joint luxations were diagnosed. Three months after admission 11 horses were sound at walk and trot. Three horses showed a lameness grade 2-3/5. One of these was euthanized after 4.5 months because of severe OA in the MTP joint. Another horse had been euthanized because of laminitis. In 12 horses long-term follow-up examination (9 month-12 years) was possible (Tab. 1). All of them showed development of OA in the MCP/MTP joint. In 6 horses there was also mild to moderate OA in the proximal interphalangeal joint (PIPJ). 67% of the horses returned to be used as pleasure horses, as prior to injury, 13% of the horses were pasture sound, 20% were euthanized because of persistent lameness.

Discussion: Our hypothesis of open luxations having a worse outcome than closed ones could not be confirmed statistically. Both horses with closed MCP/MTP joint luxations and horses with open luxations showed development of mild to severe OA in the MCP/MTP joint. The overall prognosis for return to riding is 67%. There is no study talking of development of OA in the PIPJ as a consequence of a fetlock luxation. In our study, 40% (n=6) of the horses developed OA in the PIPJ after several months.

BACTERIA ISOLATED FROM LAPAROTOMY INCISIONS: RELATIONSHIP OF RESULTS TO INCISIONAL COMPLICATIONS. Smith LJ, Perkins, J*, Mair TS. Bell Equine Veterinary Clinic, Mereworth, UK; Royal Veterinary College, Hatfield, UK.

The prevalence of celiotomy incisional infections in horses is reported to vary between 4 and 27%. Although there is wide variation in these figures, there was also a difference in classification of the definition of 'wound infection'. Studies have documented the occurrence of complications, and attributed these to the colonization of the incision with bacteria. However, no studies have reported the exact populations of bacteria found in these incisions, or whether antimicrobial resistance patterns will alter during the course

of hospitalization, and antimicrobial administration. The purpose of this study is to identify and document the populations of bacteria isolated from celiotomy incisions, and the resistance patterns of bacteria to commonly used antimicrobials during hospitalization.

Any horse undergoing an exploratory celiotomy, at either of 2 institutions, was eligible for inclusion. At 12 hours post-operatively swabs were taken from the skin overlying the xyphoid process, and from the cranial aspect of the incision. The incisional swab was repeated after 5 days. Swabs were submitted for both general culture and sensitivity, and methicillin resistant *Staphylococcus aureus* (MRSA) specific culture.

To date 27 horses have been included in the study. The most common isolates (20 horses) were considered to be skin commensals. Other isolates included MRSA (2), *E Coli* (2) and *S aureus* (1). Antimicrobial resistance of isolates after 5 days of hospitalization included: penicillin (6), gentamicin (4), and cephalosporins in addition to penicillin and gentamicin (2).

Incisional dehiscence occurred in horses that cultured MRSA (2) and *S aureus* (1), with all isolates being resistant to standard antimicrobial protocols. Incisional drainage was noted in 2 horses where skin commensals only, and where *E Coli* (2), were isolated.

These results show that those horses that go on to develop severe incisional complications cultured bacteria resistant to commonly used antibiotics within 12 hours of surgery, with 2 horses culturing MRSA at this time. It is likely that these bacteria are resident on the horse prior to surgery, predisposing it to the development of incisional infections, despite the routine use of broad spectrum antimicrobials.

INVESTIGATION OF THE SENSITIVITY AND SPECIFICITY OF SPECIFIC RADIOGRAPHIC ABNORMALITIES FOR DIAGNOSIS OF EQUINE CHEEK TOOTH PERIAPICAL INFECTION. Townsend NB, Hawkes CS, Rex R, Boden L, Barakzai SZ*. University of Edinburgh, Edinburgh, United Kingdom.

Radiography is widely used in the diagnosis of equine cheek tooth (CT) periapical infection and recent studies have evaluated the sensitivity and specificity of radiography in making this diagnosis. The aim of this study was to investigate the sensitivity, specificity, negative and positive predictive values (NPV, PPV) of specific radiographic changes associated with apical CT infection.

Thirty-eight apically infected teeth from 35 horses were identified and a Triadan number and age matched control tooth was selected for each. Original DICOM images were cropped in a manner that only the tooth and minimal surrounding area was visible. Images were blindly evaluated by 3 clinicians for 14 specific radiographic abnormalities identified from the literature. Based on the radiographic abnormalities a final diagnosis (infected/not infected) was given by each clinician.

Mean sensitivity and specificity for diagnosis of apical CT infection were 74% and 74% respectively, with a positive predictive value (PPV) of 69% and a negative predictive value (NPV) of 79%. Moderate agreement was noted between observers for 50% of radiographic signs (Kappa 0.4-0.6). Highest receiver operating characteristic curves were noted for periapical sclerosis, periapical halo, clubbing of the apex, and degree of clubbing. The severity of the radiographic change observed appeared to be significantly associated with the risk of the tooth being infected for all these abnormalities, with mild changes being unreliable indicators of infection.

Teeth with loss of the lamina dura denta were 9.3 times more likely to be infected ($P \leq 0.039$), though in many cases, the lamina dura denta could not be clearly discerned, and in such cases, teeth were also at increased likelihood of being a case (OR 7.8, ≤ 0.021), indicating that interpretation of changes to the lamina dura denta is clearly difficult and unreliable.

Periapical sclerosis appeared the most consistent radiographic abnormality associated with periapical infection with a PPV of 61% and NPV of 85%. Mild periapical sclerosis was on average, not statistically significantly (OR 4.5, $P \geq 0.05$) associated with apical infection. Teeth with moderate periapical sclerosis were 17 times ($P < 0.005$) more likely to be an apically infected case than a control. Moderate or large periapical halos (OR 5.3-7.9, $P \leq 0.026$) and moderate to severe clubbing (OR 7.7-9.1, $P \leq 0.011$) were also reliable indicators of periapical CT infection.

BIOCHEMICAL MARKERS AND RADIOGRAPHIC SCORES AS AN EVALUATION FOR THE OSTEOARTICULAR STATUS OF WARM-BLOOD STALLIONS. Verwilghen D., Busoni V., Saliccia A., Grulke S.*, Serteyn D. Faculty Veterinary Medicine of Liege, Belgium.

Establishing the osteoarticular status of the horse is often performed by means of radiological screening of the animals. Widespread blood sampling could potentially be an alternative to this procedure which is time consuming and sometimes technically difficult. The aim of this study was to investigate the relationship between the radiological status of the horses and the levels of biochemical markers (BM) of cartilage degradation and synovial inflammation.

Materials and Methods: A specific radiological scoring (RS) system was developed and applied on 63 stallions presented for studbook admission. Additionally, groups of horses were established according to the occurrence of osteochondrosis (OC), degenerative joint disease (DJD) and distal interphalangeal joint (DIPJ) effusion. Insulin growth factor-I, myeloperoxidase, Coll2-1 and Coll2-1NO₂ were used as BM. The effects of age and weight on the BM and of the BM on the RS were measured. Mean values of BM between OC positive versus negative, DJD positive versus negative and DIPJ effusion positive versus negative were compared using SAS statistical program.

Results: No effect of the combined BM was found on the RS. No significant differences between the values of the BM were found within the different radiological classes (RC). However a tendency ($p=0.06$) towards an increase in RS by 0.45 for each increasing unit of Coll2-1NO₂ was present. Significant positive correlations were found between Coll2-1 values and Coll2-1 NO₂ values. MPO values were found to be significantly higher in OC negative horses (357.86 ± 64.43 ng/ml) than in OC positive horses (231.17 ± 27.15 ng/ml). IGF-I levels were found significantly lower in the positive DIPJ effusion group (416.05 ± 17.57 ng/ml) compared to the negative DIPJ effusion group (477.1 ± 22.40 ng/ml). Coll2-1 values were significantly higher in the positive DIPJ effusion group (911.04 ± 41.13 nM) compared to the negative DIPJ effusion group (769.04 ± 37.92 nM). Mean values of Coll2-1 were significantly higher in the DJD positive group (901.24 ± 36.75 nM) compared to the DJD negative group (790.590 ± 39.397 nM).

Discussion: The combination of the blood parameters did not seem to correlate with the used RS system. Coll2-1NO₂ levels however tend to increase with poorer RS and could therefore be used as a useful predictor of the osteoarticular status of the horse. Coll2-1 levels were significantly higher in the degenerative joint disease group. A high percentage of horses with DIPJ effusion was present in this study and was associated with decreased IGF-I and increased Coll2-1 levels.

EVALUATING A PROTOCOL FOR THE THREE-DRILL TECHNIQUE FOR FACILITATING ANKYLOSIS OF THE DISTAL TARSAL JOINTS IN HORSES. Voute, L.C, MacDonald, SA and Lischer C*. Faculty of Veterinary Medicine, University of Glasgow, Glasgow, UK.

Introduction: Transarticular drilling is an established surgical treatment for osteoarthritis of the distal tarsal joints. This study's objectives were to describe a protocol for the technique in detail and to develop an *in vivo* technique for measuring the proportion of the articular surface destroyed.

Materials and Methods: Three 4.5 mm diameter tracts were drilled across the tarsometatarsal (TMTJ) and centrodistal (CDJ) joints of 10 isolated equine tarsi: a 20 mm long tract directed towards the most lateral palpable extremity of MTIV; second a 20 mm tract angled 30° to the first in plantar direction; and third a 35 mm tract angled 30° to the first in dorsal direction. Drilling was monitored fluoroscopically (Ziehm Vision Vario 3D C-arm, Ziehm Imaging GmbH, Nuremberg, Germany). Measurements made from multiplanar reconstruction of scans performed using the C-arm were used to calculate the percentage of the area of the articular surface destroyed and were compared to measurements made from digital photographs of disarticulated tarsi.

Results: The average area of the articular surface destroyed by drilling was $298.8 \text{ mm}^2 (\pm 21.0)$ for proximal MTIII and $295.8 \text{ mm}^2 (\pm 28.1)$ for proximal third tarsal bone, which corresponded to 18.9% and 21.7% on average of the articular surfaces respectively. The average percentage area of articular surface destroyed by drilling was 1.5% greater (range 0.0–3.2%) for proximal MTIII and 2.1% (range 0.5–4.9%) greater for proximal third tarsal bone when the calculation was based on measurements made from C-arm images.

Conclusions: The procedure described destroyed a consistent area of the articular surfaces of the TMTJ and CDJ and would be suitable for use in prospective studies designed to evaluate patient outcome. Measurement of the percentage of the articular surface of the distal tarsal joint destroyed by transarticular drilling made from multiplanar reconstruction of a C-arm scan corresponded to the measurement made from photographs of the articular surfaces.

Large Animal Posters

NEAR INFRARED SPECTROSCOPIC ASSESSMENT OF TISSUE OXYGEN SATURATION DURING NORMAL AND IMPAIRED WOUND HEALING IN HORSES. C. Celeste*, K. Deschesne, C. Riley#, C. Theoret. Faculté de Médecine Vétérinaire, Université de Montréal, Canada. #Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, Canada.

Introduction: Wound repair in horse limbs is often complicated by the development of exuberant granulation tissue (EGT) while body wounds tend

to repair uneventfully. The exact pathogenesis of EGT formation is unknown. Tissue hypoxia could be a major contributing mechanism as in human keloid formation. The objective of this study was to investigate tissue perfusion and tissue oxygen saturation by use of Near InfraRed Spectroscopy (NIRS) in an *in vivo* equine model of body and limb wound healing.

Materials and Methods: Six 2- to 3-year-old mares were studied. Full-thickness wounds were surgically created on the dorso-lateral surface of each metacarpus, and on one lateral thoracic wall, while the horses were standing under sedation and local anesthesia. One randomly chosen forelimb of each horse was banded postoperatively to induce EGT formation and lead to excessive scarring, as reported previously. Haemoglobin oxygen saturation, as well as water content, were determined by use of NIRS. Data were collected from each wound per site (unbanded thorax; unbanded limb; banded limb) 12 hours, 1 day, 2 days, 4 days, 1 week, 2 weeks and 4 weeks following wounding.

Results: A mixed model MANCOVA revealed a statistically significant difference in haemoglobin oxygen saturation (HOS) and water content (WC) among wound sites, over time but not among horses ($P<0.05$). The HOS was significantly greater in thoracic wounds than limb wounds over time ($P<0.05$). The WC was significantly greater in unbanded wounds (both thorax and limb) than in banded wounds over time ($P<0.05$).

Discussion: Occlusion of microvessels in the granulation tissue of limb wounds, especially those developing EGT, but not body wounds of horses was recently documented as the consequence of endothelial cell hypertrophy. We report here that the HOS and WC are significantly inferior in limb wounds, especially in those developing EGT. Taken together, these findings suggest that an environmental hypoxia may affect limb wounds in horses leading to impaired wound healing.

LOCATION OF THE RADIOGRAPHIC LESIONS OF THE THORACOLUMBAR COLUMN IN 102 FRENCH TROTTERS WITH BACK PAIN. Cousty M.¹, Retureau C.¹, Tricaud C.², Caure S.², Geffroy O.^{1*} ¹Ecole Nationale Vétérinaire, Nantes, ²Clinique Vétérinaire Equine de Livet, St Michel de Livet, France.

Introduction: Little radiographic data have been produced on the equine axial skeleton with most of them focusing on lesions of dorsal spinous processes. We hypothesized that radiographic lesions of the dorsal spinous processes and synovial intervertebral articulations would be seen in specific regions of the thoracolumbar spine (caudal thoracic region and thoracolumbar junction respectively).

Material and Methods: The radiographs of 102 French trotters presented for back pain were evaluated. Age, gender, type of race (harness race, saddled race or both), number of starts at the time of examination, earnings at the time of examination, index of trot 2007 (ITR) were recorded. Radiographic evaluation was performed from the 14th thoracic (T14) to 3rd lumbar (L3) vertebrae. Impingement of spinous processes (ISP), periarticular proliferation of synovial intervertebral articulations (PP-SIA) and sclerosis of synovial intervertebral articulations (S-SIA) were located and graded radiographically depending on the severity of the lesion.

Results: ISP was recorded in 31 horses at 94 interspinous spaces and was most commonly encountered between T15-T18. PP-SIA was recorded in 95 horses at 248 synovial intervertebral articulations and was most commonly encountered between T17-L2. Males had significant less PP-SIA than geldings or females. S-SIA was recorded in 41 horses at 90 synovial intervertebral articulations and was most commonly encountered between T17-L3.

Discussion/Conclusion: In French Trotters, radiographic lesions of synovial intervertebral articulations were more frequently observed than lesions of dorsal spinous processes. Radiographic lesions of dorsal spinous processes were more frequently encountered in the caudal thoracic region whereas lesions of synovial intervertebral joints were more frequently encountered at the thoracolumbar junction. This survey may help to improve diagnosis and management of racing Standardbreds presented for back pain, but further investigation of the prevalence of these lesions in Standardbreds without clinical signs of back pain is merited.

EFFECT OF RADIAL PRESSURE WAVES ON THE EQUINE PROXIMAL THIRD PORTION OF THE SUSPENSORY LIGAMENT OF FORELIMBS, FOR INDUCTION OF NEOVASCULARISATION: A PILOT STUDY.

Denninger, K.C.M.¹, Falk M.-L.², Odgaard K.L.³, Christophersen M.T.⁴, Boesen M.⁵, Falk-Rønne J.⁶, Langberg H.⁷, ¹Nørslund Equine Hospital; ²Vesterborg Equine clinic; ³Nørager Equine clinic; ⁴University of Copenhagen; ⁵Parker Institute, Human Hospital Frederiksberg; ⁶Lundens Equine clinic; ⁷Human Hospital Bispebjerg.

Introduction: Focused extracorporeal shock wave therapy (ESWT) and radial pressure wave therapy (RPWT), also named non-focused shock wave therapy, have since the 1990's been used for the treatments of tendon and ligament injuries in horses. Scientific evidence of the use in horses of these methods are however sparse. The physical properties of ESWT and RPWT

differ substantially in pressure, wave length and point of maximum energy density, making RPWT not shocked nor focused. Thus these methods may be expected to yield different results. However, many clinical studies concerning "shock wave therapy" use and consider these waveforms synonymously, that may confuse the rationale and outcome of these studies. Most scientific studies have been conducted using ESWT. Thus, the purpose of this study was to monitor the effect of RPWT at the origin of the suspensory ligament (SL) in relation to induction of injury and neovascularisation in four horses with no detectable pathology at the origin of the SL.

Materials and Methods: Four horses were treated three times each and the effects monitored weekly over a period of ten weeks, using B-mode and Colour Doppler ultrasound scanning as well as subjective visual lameness evaluation and palpation. Statistical analyses were performed using Proc. Mixed-ANOVA using SAS enterprise 3.0.

Results: No neovascularisation was detected at the proximal SL. Ultrasonographic examination showed no changes to fibre alignment and fluid content of the SL.

Conclusion: The data in the present study shows no negative effect of the RPWT at the origin of the SL. Neovascularisation was not detected at the proximal SL. The use of Doppler scanning can be used to evaluate blood flow within suspensory ligaments in the horse, before and after the RPWT in the proximal SL.

NEUTROPHIL ELASTASE MEASUREMENT IN BLOOD OF HORSES WITH NATURALLY OCCURRING LAMINITIS. G. de la Rebière de Pouyade, S. Grulke*, A. Salciccia, D. Serteyn. Equine Clinic, Faculty of Veterinary Medicine, Belgium.

Introduction: We hypothesized the role of neutrophil elastase (NE) in the conversion of pro-MMP into active form and evaluated the possibility of this theory by comparing plasmatic equine NE between horses suffering from laminitis and healthy horses.

Materials and Methods: NE was purified from whole blood and used for obtaining polyclonal antibodies from guinea pig and rabbit immunization. A specific ELISA was developed for measuring NE in plasma from EDTA blood samples. Mean normal blood value from 37 healthy horses and NE blood level in 29 horses suffering from acute laminitis referred in our clinic was determined. The NE concentration was measured from blood collected within the first 4 days of hospitalization. Values from healthy and laminitis horses were transformed (natural logarithm) for the normality test and compared by using an unpaired t-test. Significance was set at $p < 0.05$.

Results: Purified NE was characterized by enzymatic assay and electrophoresis. Its molecular weight was 29 KDa. The immunoreactivity of the antibodies was controlled by radial immunodiffusion. The ELISA was sensitive and specific for measuring NE in plasma (from EDTA anticoagulant tubes). The mean NE value \pm SD in healthy horses was 32.53 ± 28 ng/ml. In horses suffering from laminitis the mean value was 202 ± 187.22 ng/ml, significantly different from the normal value ($p < 0.0001$).

Discussion: Increased mean level of NE in blood of laminitis horses reduces the systemic nature of laminitis with neutrophils recruitment, activation and degranulation. As for the MPO, increased NE in the blood could reflect the localized infiltration of NE in laminar tissues. In situ, NE as serine protease could activate the MMP, especially MMP-9 from neutrophil. Thus, NE could play an important role in the enzymatic pathway of laminitis and could be the target of new treatment options.

LOCAL ANTIBIOTIC THERAPY IN EQUINE INFECTIONS: THE OLD AND THE NEW - REVIEW. S.K. Hart, J.J.G. Barrett, K.E. Sullins. Marion duPont Scott Medical Center, Leesburg, VA.

Orthopedic and soft tissue infections are associated with a high morbidity and mortality in horses. The use of effective systemic antimicrobials is often precluded in horses because of the prohibitive costs and the risks of organ toxicity associated with systemic administration. Use of local antibiotic therapies as an adjunct treatment in orthopedic and soft tissue infections has increased in human patients because their application is associated with decreased morbidity, hospital stay and cost of medical treatment. Local antibiotic therapy in horses is a source of interest and research, because of the risks and failures that can be encountered in aggressively treating an adult horse with a soft tissue or orthopedic infection with systemic antimicrobials alone. This presentation is a concise discussion of the currently available local antibiotic therapeutic modalities, and the advantages and disadvantages of each. It introduces several novel methods of delivering local antibiotics in high concentrations, and the applications in which these have been used in the authors' hospital, both in orthopedic and soft tissue infections. Routine methods of delivering high concentrations of antibiotics locally include regional limb infusion, direct injection of an appropriate antibiotic in to a synovial structure, and the use of antimicrobial-impregnated polymethylmethacrylate beads. Intravenous and intraosseous regional limb infusion are effective means

of achieving significantly high levels of antibiotics in a distal limb, but are not useful to treat more proximal infections. Direct injections of an antimicrobial in to a joint can only achieve sufficiently high concentrations for up to 48 hours. Polymethylmethacrylate antibiotic-impregnated beads have many disadvantages including being non-biodegradable; low biocompatibility; the potential for resistance to develop; and heat-labile antibiotics cannot be used. Newer methods of providing local delivery of antimicrobials are available. Continuous infusion is an effective method of continuous delivery of antibiotics, but the apparatus can be difficult to maintain. Newer biodegradable, biocompatible antibiotic delivery devices include calcium sulfate beads and a novel cross-linked dextran gel. Calcium sulfate beads are biocompatible, fully biodegradable, nonimmunogenic and osteoconductive. A variety of antimicrobial agents may be incorporated in to them, and they have been shown to elute clinically effective concentrations *in vitro* for up to 10 days (the end-point of the study). Cross-linked dextran gel is a relatively new product, and has proven to be useful in the management of a wide variety of soft tissue and orthopedic infections. A variety of antimicrobials have been incorporated.

REFERRED PAIN AS A CAUSE OF POOR PERFORMANCE IN RIDING HORSES. Lindegaard C, Pihl TH, Andersen PH. University of Copenhagen, Denmark.

This abstract describes two cases of riding problems that were fully eliminated after treatment of the underlying visceral inflammatory conditions.

Case 1: Danish Warmblood gelding, 6 y, show jumper, referred with acute urinary obstruction. Clinical exam revealed hypersensitivity at the back and flank area. Endoscopy of the urinary tract concluded in a diagnosis: urinary calculosis and cystitis. Treatment: Uroliths were removed via a perineal urethrotomy and the cystitis was treated with NSAID and antibiotics.

Case 2: Thoroughbred mare, 11 y, low-level dressage referred because of recurring moderate colic, weight-loss and loose feces. Clinical exam revealed hypersensitivity of the back and flanks, a painful ovary on rectal exam, and poor conformation of the vulva with a resulting vaginitis. Diagnosis: Vaginitis. Treatment: Vulvoplastic *ad modum* Caslick's procedure including topical administration of hydrocortisone, local analgesia and antibiotics once.

Discussion: Thorough anamnesis of both horses showed increasing riding problems over the preceding 3 months, including; rearing, bucking, refusing the fences, refusing to move sideways, aggression, kicking after the riders' legs. Both horses were examined for orthopedic and back problems by private practitioners and equine chiropractors without results prior to referral. On follow up at 3, 6 and 9 months hypersensitivity and riding problems were completely resolved. Humans and laboratory animals with urogenital inflammation show similar signs; hypersensitivity of the lower back and abdomen and loose feces. Hence it is suggested that viscerosomatic convergence ("referred pain") from the visceral inflammatory conditions were the cause of the riding problems observed in the two cases. Poor performance and riding problems are generally caused by musculoskeletal, cardiac and respiratory disease. However in some cases it is not possible to establish a diagnosis related to these organs. Referred pain from a visceral inflammatory condition might be the cause of the poor performance in some cases and should be investigated when a more "common" diagnosis can not be made.

ALTERATIONS IN GLUTATHIONE METABOLISM COULD BE IMPLICATED IN INTESTINAL CELL INJURY SECONDARY TO EQUINE COLIC. G. Marañón¹, W. Manley¹, C. García², P. Cayado¹, M.S. de la Muela³ and E. Vara². ¹Horsepital SL, ²D. Bioquímica Molecular, F. Medicina, and ³D. Medicina y Cirugía Animal, Madrid, Spain.

Background: Colic can be accompanied by physiological changes gastrointestinal tissues, such as the intestine. This process might be due to the accumulation of oxidative damage induced by reactive oxygen (ROS) and reactive nitrogen species (RNS). Glutathione (GSH), being the major intracellular thiol, provides protection against oxidative injury. The aim of this study was to investigate whether colic-induced oxidative damage is related with an impairment in GSH metabolism.

Methods: Twenty-nine adult horses subjected to emergency abdominal surgery of the small intestine surgery due to were used. Blood samples were obtained from the jugular vein and centrifuged at 3000 rpm \times 10 min. Two samples (proximal, and distal to the stenosis) of jejunum were also obtained, and stored frozen at -80°C until determinations of nitric oxide (NO), carbon monoxide (CO), glutathione (GSH), lipid hydroperoxides (LPO), ATP, and methionine-adenosyl-transferase and methyl-transferase activities.

Results: Colic was accompanied by a significant increase in nitric oxide and carbon monoxide and a reduction in reduced glutathione, ATP, as well as in methionine-adenosyl-transferase and methyl-transferase activities.

Conclusions: Our results suggest that colic induces harmful effects on horse intestine, probably due to an increase in oxidative damage and pro-inflammatory molecules. This effect could be mediated, at least in part by an impairment in glutathione metabolism.

SUCCESSFUL MINIMAL INVASIVE COIL EMBOLISATION OF A PORTOSYSTEMIC SHUNT IN A FOAL. Martens A.*¹, Nollet H.², Saunders J.H.³, Schauvliege S.¹, Defreyne L.⁴. ¹Department of Surgery and Anaesthesiology of Domestic Animals, ²Department of Large Animal Internal Medicine, ³Department of Medical Imaging, Faculty of Veterinary Medicine, ⁴Department of Vascular and Interventional Radiology, Faculty of Medicine and Health Sciences, Ghent University, Belgium.

Introduction: Portosystemic shunts in foals are rare and their surgical treatment is difficult due to the limited access to the portal system. The present report describes the use of interventional radiology for transvenous embolization of a portosystemic shunt with stainless steel coils.

Case Description: A 2 months old Arabian thoroughbred foal was presented to the clinic with neurological signs. Clinical exam and blood analysis were indicative for a portosystemic shunt and this diagnosis was confirmed with transsplenic scintigraphy. Temporary treatment with Lactulose and Metronidazole resulted in normalization of clinical signs.

A first general anesthesia was performed to determine the location and diameter of the portosystemic shunt. First, an indirect portosplenogram was performed by catheterization of the femoral artery to identify the presence of normal splenic vasculature. Next, the exact localization of the shunt was determined by catheterization of the caudal caval vein via the femoral vein, and introducing the cobra-shaped catheter in the 20 mm diameter shunt. Coil embolization could however not be performed through this approach due to the sharp angulation of the shunt relative to the caudal caval vein. In a second general anesthesia, the shunt was reached through catheterization of the jugular vein. First, a tulip-shaped vena cava filter was placed in the shunt, followed by the application of 26 coils within the filter. In this way, migration of the coils with the high blood flow was prevented. The coils resulted in a very important reduction of the blood flow through the shunt and deviation to the liver vessels. Severe portal hypertension was not observed. The foal was kept on Lactulose diet for 1.5 months after surgery. Five months later, the clinical outcome was still good.

Discussion: Minimal invasive coil embolization of portosystemic shunts is possible in the foal and certainly offers a great advantage for intrahepatic shunts. When gaining more experience, the technique can probably be simplified in terms of approaches and number of coils required.

SAFETY OF FUCOIDAN SOLUTION IN HORSES: CLINICAL FINDINGS. Morello S[†], Southwood LL[†], Slack J[†], Crack A^{††}, Springate CMK^{††}. [†]University of Pennsylvania, Pennsylvania, USA; ^{††}Vancouver, British Columbia, Canada.

Introduction: It has been demonstrated in various animal models that fucoidan solution prevents adhesions. The purpose of the current study was to evaluate the clinical-related safety of fucoidan solution in horses. Our hypothesis was that following abdominal surgery in adult horses the intraperitoneal administration of fucoidan solution would not influence physical or blood related clinical parameters.

Materials and Methods: Healthy horses were entered into a block randomized, blinded study to compare fucoidan solution (n=6) with Lactated Ringer's Injection USP (control LRS) (n=6). Horses underwent a jejunojejunostomy at 2 sites and immediately before final suture 5L of fucoidan solution or control LRS were administered intraperitoneally. Clinical parameters were recorded during physical examination performed every 12 hours for 10 days. Blood was drawn preoperatively and on days 1, 2, 6, and 10 and hematology, coagulation and blood chemistry profiles determined.

Results: No differences were observed between treatment groups for heart rate, temperature, colic, incision infection and peritonitis. Fucoidan solution treated horses had a greater volume of post-operative reflux than control LRS treated horses; however, all horses recovered with medical management. No differences were observed between treatment groups for platelet count, fibrinogen concentration, activated partial thromboplastin time, gamma glutamyl transferase, aspartate aminotransferase or creatinine concentration. Differences were observed at some time points between fucoidan solution and control LRS treated groups for leukocyte count, neutrophil count, antithrombin III, prothrombin time and hematocrit levels; however, the values were generally within normal ranges for both groups.

Conclusion: Fucoidan solution was safely administered intraperitoneally during celiotomy and anastomosis in horses. Although post-operative reflux had not been observed in earlier pony foal studies it may be helpful to further investigate fucoidan solution and this parameter. Fucoidan solution appears to act as a physical barrier between damaged peritoneal tissues and may be appropriate for use in horses during abdominal surgery.

EVOLUTION OF BLOOD MYELOPEROXIDASE IN THE PERIOPERATIVE PERIOD OF HORSES UNDERGOING EMERGENCY CELIOTOMY. Saliciccia A., Grulke* S., de la Rebière de Pouyade G., Verwiltgen, D., Serteyn D. Faculty of Veterinary Medicine of Liege, Belgium.

Colic can cause an activation of neutrophils with release in the blood flow of myeloperoxidase (MPO), a specific enzyme with strong oxidative activity. The

aim of this study was to describe the evolution of plasma MPO after colic surgery. Materials included 13 adult horses that underwent an emergency celiotomy for acute intestinal obstruction. Venous blood samples were collected into EDTA anticoagulant tubes before surgery, during surgery after correction of the intestinal lesion and during the recovery of anesthesia. In the postoperative period samples were taken every 4 hours during the first 4 days (from day 0 until day 4), every 12 hours during the days 4 and 5 and every 24 hours until day 10. MPO was assayed with a specific enzyme-linked immunosorbent assay. Statistical analysis was performed by 1-way ANOVA with student-Newman-Keuls post test on data obtained for each time point. Significance was set at p<0.05. The horses underwent surgery for an obstruction of the small or the large intestine. In six cases the postoperative period was uneventful, the 7 remaining developed one or 2 severe complications. Eight horses were discharged and 5 died during the hospitalization. The general aspect of the curve of mean plasmatic MPO can be described as follows: An increase was observed from the admission on until a peak of concentration occurring generally during the time of recovery from the anesthesia. With the highest mean value reaching 740.84 ± 507.61 ng/mL. This was followed by a progressive decrease until the lowest value, usually near to day 2 after the recovery from anesthesia corresponding to 171.79 ± 76.21 ng/mL of MPO. Afterwards, the mean concentrations increased slowly until postoperative day 10. In the majority of cases a stable and low MPO value (plateau) was observed during approximately 2 days (from day 1 to day 3 postoperatively). The initial peak of MPO after surgery could be associated to the neutrophil activation consequent to the intestinal disorder and the intense stimulation of the celiotomy. The following significant reduction in concentration could be attributed to MPO infiltration into the tissues with a critical point at approximately 2 days after surgery. This study may contribute to a better understanding of the role of the MPO and neutrophils in the pathophysiology of horses in the postoperative period after colic surgery.

NON-INVASIVE SURVEILLANCE OF CANNON BONE BY QUANTITATIVE ULTRASOUND IN THOROUGHBRED RACEHORSES. Tabar-Rodríguez JJ¹, Cruz AM*¹, Monteith, G¹, Gordon, K², Hurtig MB*. ¹Department of Clinical Studies, Ontario Veterinary College, ²The Department of Biological Engineering, School of Engineering, University of Guelph, Guelph, Canada.

The objective of the study was to explore the association between the speed of the sound (SOS) at nine sites in the third metacarpus (McIII) of racing Thoroughbreds with workload accumulation, and the effect of McIII failure in this association. Sixty-two 2 and 3 year olds Thoroughbred racehorses in racing condition were followed during the 2007 race meet.

The workload was calculated as total cumulative work index (CWI_{total}) and also three independent CWIs for the different gaits (CWI_{trot}, CWI_{gallop}, and CWI_{trace}) used during training and racing. The SOS was followed in a monthly bases, and compared with the CWIs using regression analysis.

SOS was found to be significantly associated with CWI_{total} at eight sites, and with the nine sites when using the independent CWIs for the different gaits (P values <0.05). SOS progression in McIIIs with workload was significantly different in horses with clinical signs of metacarpal bone failure compared to normal McIIIs in one site when using CWI_{total}, and in five sites when using the independent CWIs for the different gaits (P values <0.05). These results indicate that SOS in the third metacarpus of racing Thoroughbreds follows a constant pattern of progression as workload accumulates, and that SOS corrected for activity level may be able to identify horses at risk of bone failure.

COMPUTED TOMOGRAPHY (CT) TO ASSIST ORTHOPAEDIC SURGERY IN THE HORSE: USE OF REVERSED PERIOSTEAL FLAPS IN THE REPAIR OF LARGE NASOCUTANEOUS FISTULAS IN 2 HORSES. K. Velde*¹, B. Linsbichler³, M. Egerbacher¹, T. Stashak². ¹Veterinary University of Vienna, Vienna, Austria, ²Colorado State University, Fort Collins, CO, ³University of Zurich, Zurich, Switzerland.

Head injuries or wound healing problems after paranasal sinus surgeries in horses can lead to large full thickness defects. These defects can be challenging to repair once the tissue loss is extensive and a nasocutaneous fistula develops. We describe herein the use of reversed periosteal flaps as a valuable technique in repairing large nasocutaneous defects in two horses.

Under general anesthesia and after aseptically preparing the surgical site the mucocutaneous junction was incised until the bony edges of the defect were reached. Release incisions were made in the skin at the caudal and rostral aspects of the defect and on both sides in order to mobilize enough skin and expose the periosteum. The resulting skin flaps were reflected away from the wound to either side to a distance that measured a little more than half the diameter of the bony defect to be covered. At that distance the periosteum was sharply incised parallel to the bony perimeter of the defect and mobilized from the underlying bone with periosteal elevators. The periosteal elevation

was carried out until the bony limits of the defect were reached creating a periosteal flap on either side sufficiently large enough to cover the wound completely. The two flaps were then reversed into the defect and sutured. Care must be taken to keep the periosteum attached to the bony edges as completely as possible in order to prevent compromising the blood supply. The

described reversed periosteal flaps proved useful in repairing large nasocutaneous defects in two horses. The functional and cosmetic outcome was satisfactory in both cases, although more than 12 months after closure of the defect in 1 horse there was no evidence of bone formation within the repair tissue.