respectively (controls: 2541±293 pmol/g) (p<0.05). Although substance P levels in the the ACLT+pMMx (160±39 pmol/g) and the MIA model (226±67 pmol/g) were elevated when compared to the control group (111±49 pmol/g), this difference was not statistically significant. However, dynorphin concentrations were significantly decreased with concentrations of 370±70 and 418±107 in the ACLT+pMMx and MIA models respectively (controls: 779±111 pmol/g) (p<0.05). Histological evaluation revealed severe cartilage loss in the MIA model and comparatively minor changes in the ACLT+pMMx model, confirming articular lesions in both models.

Conclusions: Clearer behavioural nociceptive responses related to gait parameters of the osteoarthritic limb were seen with the MIA model suggesting that it may be a better model for the evaluation of therapeutic strategies for joint pain palliation when compared to the ACLT+pMMx model, with respect to the length of the study.

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VALIDATION OF AN EXPERIMENTAL DEVICE SIMULATING THE STANCE PHASE OF A CANINE HINDLIMB AT TROT IN THE CRANIAL CRUCIATE DEFICIENT STifle: AN IN VITRO KINEMATICS STUDY

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Purpose: Animal models are frequently used in medical research. The use of the Pond-Nuki model is well established in the field of Osteoarthritis (OA). In the past years, the use of 3D kinematics has gained in popularity because it provides objective means of assessing the function of joints/limbs. To this date, most in vitro studies analyzing kinematics of the canine stifle were made in 2D under low static loads. To the authors’ knowledge, this model is the first quasi-dynamic weight bearing in vitro model of 3D kinematics of the canine cranial cruciate ligament deficient stifle.

Goal: Our goal was to use a validated experimental device simulating a quasi-dynamic model of the stance phase at trot of the canine hind limb under near physiologic conditions in the cranial cruciate ligament deficient stifle (CCLDS).

Hypotheses: 1) Kinematics generated by the device is representative of reported in vivo 3D kinematics in dogs with CCLDS;
2) Peak vertical forces generated by the loaded limbs in the device are comparable to those recorded in the literature for a trotting dog during the stance phase.

Methods: Six normal paired hind limbs were harvested from 3 adult large breed dogs euthanized for reasons unrelated to this study. The dogs were similar in age, size and body weight (range, 29.5-31 kg). The limbs were prepared and mounted on a previously validated experimental device. Each limb was submitted to vertical loading (9 kg). The gait was simulated with a computer-ized sequence using a linear actuator and a rotational motor. The stance phase of the gait at trot was simulated three times on each hind limb. Then, with the limbs still mounted in the device, the cranial cruciate ligament (CCL) was completely transected through a small medial arthrotomy which was closed using a simple continuous pattern. Kinematics of the tibia and femur was measured in the 2 situations (intact and CCLDS) with an optoelectronic system. Vertical ground reaction forces were measured with a 2.5 kN axial/torsion force transducer. Amplitude of motion and peak ground reaction forces as well as the general shape of kinematics curves were also compared with in vivo curves described in the literature.

Results: The comparison of the six average curves of motion collected on the tested stifles to those from in vivo trials reveals similar patterns. Data recorded during in vitro simulations in CCLDS highlighted the following changes between intact and CCLDS: an increase in flexion (4°), abduction (2°), internal rotation (3°), cranial translation (4mm), medial translation (1.5mm) and proximal displacement (3mm) of the tibia were recorded. These changes are comparable to those reported in vivo. However, the amplitude of changes is slightly greater on in vivo curves. Peak vertical forces measured in the device (138±2N) were also similar to in vivo trials reported in the literature.

Conclusions: Results show that the device generates reliable motion on a loaded limb which is representative of the in vivo 3D kinematics in CCLDS reported in the literature. This model could be used to evaluate the impact of OA on kinematics in the Pond-Nuki model. Furthermore, this model could be used ex vivo to evaluate the effect of different therapeutic modalities of OA. Finally and of utmost importance, this model could be adapted and used with the human knee.