UNIVERSITY OF COPENHAGEN
DEPARTMENT OF VETERINARY CLINICAL SCIENCES

Intra-articular Z-lig implant restores feline stifle stability in an *ex vivo* cruciate insufficiency model

*James Miles, Parisa Mazdarani**
Department of Veterinary Clinical Sciences, University of Copenhagen, Copenhagen, Denmark
**Current address: College of Veterinary Medicine, Gainesville, Florida*

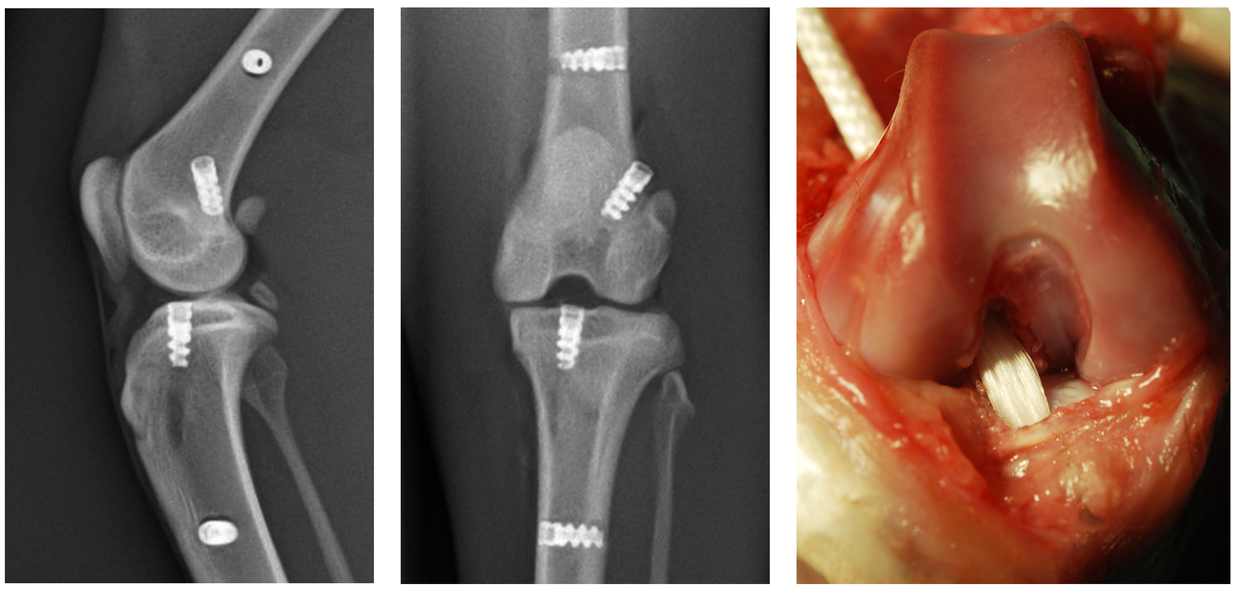
Contact details:
James Miles, Universitetshospitalet for Familiedyr,
Dyrlægevej 16, 1870 Frederiksberg C, Denmark
jami@sund.ku.dk

OBJECTIVES:
To determine stifle joint stability after intra-articular reconstruction (IAR) of the transected cranial cruciate ligament (CCL) using an ultra-high molecular weight polyethylene graft (Z-Lig, Eickemeyer) in a novel limb press model, and to report simulated muscle force ratios before and after repair.

METHODS:
Ten feline hindlimbs were prepared by coxofemoral disarticulation and removal of extraneous soft tissues. Quadriceps and gastrocnemius muscles were replaced with turnbuckles in series with load cells.

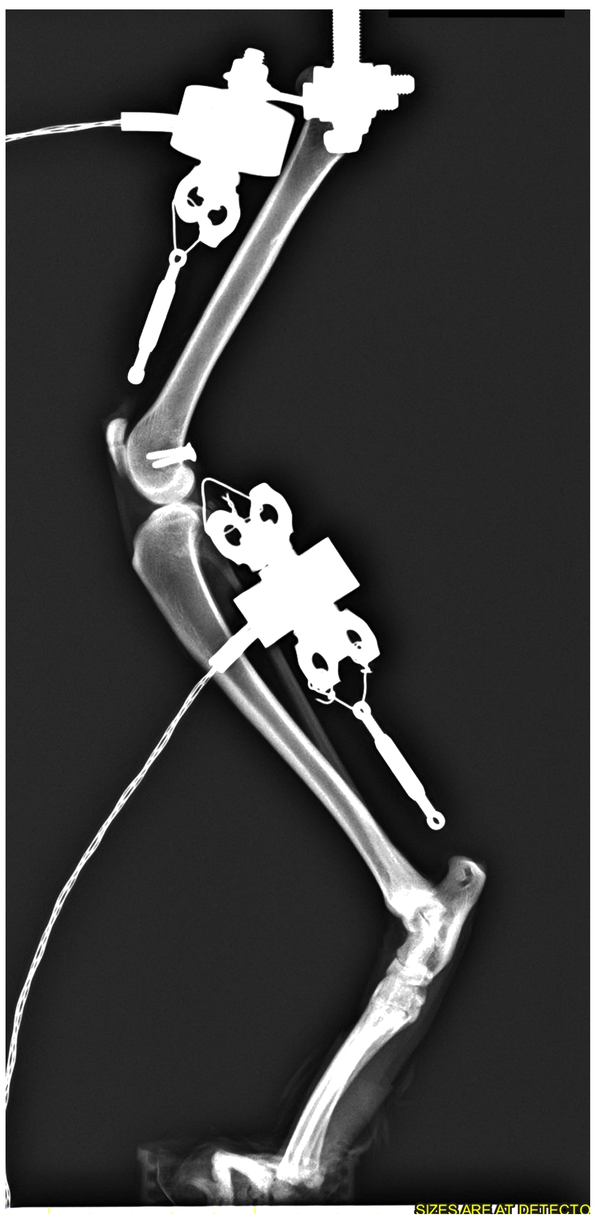
Limbs were mounted in a frame and axially loaded with 30% body weight, and turnbuckles adjusted to achieve a femoral angle of 60° ±2°, and stifle and tibiotarsal angles of 120° ±5°. Limbs were radiographed and contemporaneous load cell measurements taken.

This was repeated after CCL transection and then after IAR with a 16-fibre ultra-high molecular weight polyethylene graft and four 2.5 mm interference screws. Angles, forces and cranial tibial subluxation were analysed using repeated-measures ANOVA.

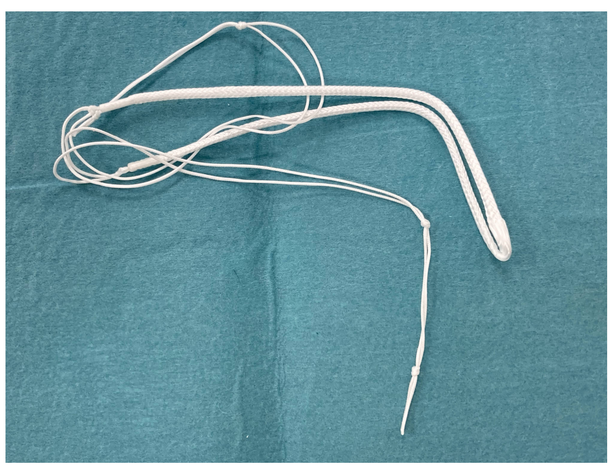


ABOVE: Example of Z-lig implantation in a feline cadaver. The graft is secured with 4 interference screws, with the central, unbraided portion lying within the joint space without twisting the fibres.

BELOW: Intact, CCL deficient, and Z-Lig reconstructed joints under 30% body weight axial loading. The cranial tibial subluxation evident after CCL transection is prevented by Z-Lig.



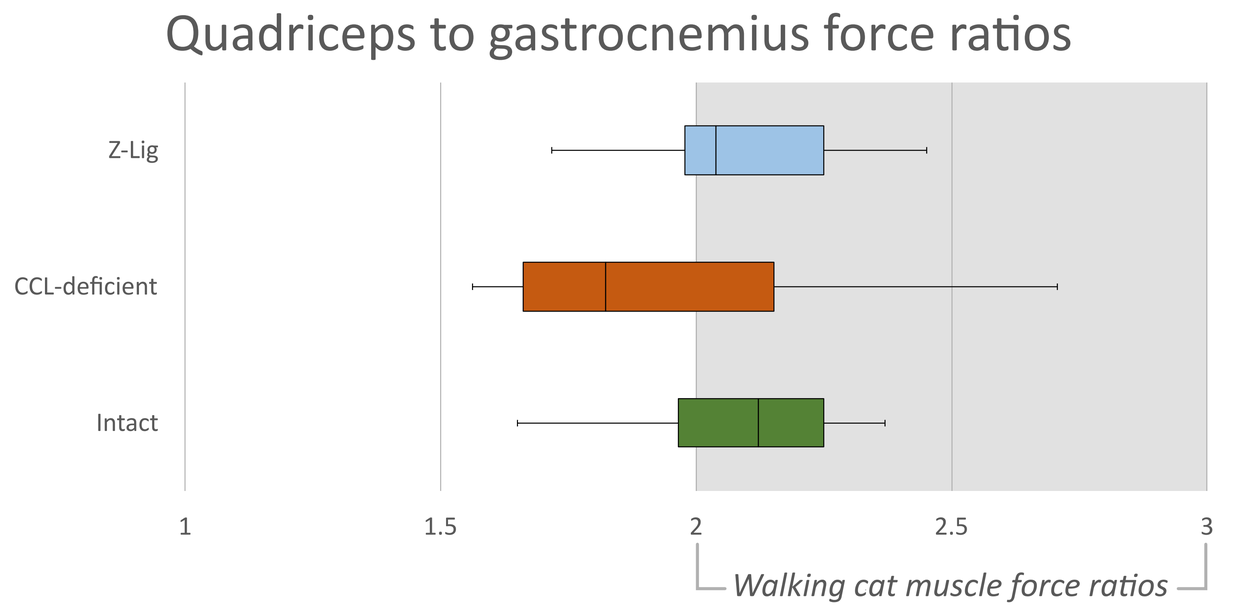
LEFT: Example of limb mounted in limb press. The proximal attachment allows flexion-extension movement but constrains rotation. Load cells are visible connected to an Arduino Uno.



ABOVE: Example of Z-Lig implant

RIGHT: Box and whisker plot of muscle force ratios for all 3 joint situations. Boxes indicate the interquartile range and whiskers extend to minimum and maximum values.
Data in the literature suggests ratios between 2 and 3 are typical in walking cats, suggesting reasonable construct validity for this limb press model.

RESULTS:
Cranial tibial subluxation after CCL transection was significant ($p < 0.001$, 5.2 mm ±0.8 mm) but there was no difference between intact and IAR ($p = 0.5$, -0.6 mm ±0.6 mm).
Angles did not vary significantly between joint situations ($p > 0.6$).
Simulated quadriceps force (53 N) was consistently ($p = 0.4$) twice the gastrocnemius force (27 N).



IMPACT:
IAR using Z-Lig restored joint stability in this model, and this system may prove useful in management of CCL rupture in cats. Positioning was repeatable and consistent, and muscle forces were more consistent with *in vivo* reports than previous feline models..

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