

Topic: Canine & Feline

DENSITY AND STRENGTH DISTRIBUTION OF THE SUBCHONDRAL BONE PLATE OF THE CANINE TALUS

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Introduction / Purpose:

The subchondral bone plate plays an important role in the load transfer across joints. The subchondral bone density distribution is a reflection of the loading history of the joint, and the heterogeneous density distribution expected to be reflected in the subchondral bone material properties. The goal of this study was to evaluate the strength of the subchondral bone plate of the canine talus and to correlate it to the subchondral bone density.

Methods:

On twenty, paired, cadaver tali of different large breed dogs, test points were defined on the subchondral bone plate. At these points the mechanical strength was determined by indentation testing, registering the maximum penetration force, and the density was measured by means of computer tomographic osteoabsorptiometry (CTOAM).

Results:

Neither the density nor the strength were distributed homogeneously over the surface of the subchondral bone plate. In all specimens, a high correlation was found between the subchondral bone density and the mechanical strength. The coefficient of determination (r^2) ranged from 0.78 to 0.96 with a mean of 0.89 and was statistically significant ($p < 0.01$). The location of the density maxima matched the location of maximal mechanical strength. There was no significant difference in the location of the density maxima and the strength maxima (p -value = 0.512).

Discussion / Conclusion:

CTOAM provides a non-invasive opportunity to not only assess and visualize the density of the subchondral bone plate on densitograms but also the mechanical strength, and to perform longitudinal studies on subchondral bone density and strength in dogs.

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