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Comparison of radiography vs. CT in equine orthopaedic trauma: Intramodality and intermodality agreement in radiography and computed tomography of equine distal limb fractures.

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Distal limb fractures constitute a relatively common, well-described and studied problem in equines [1,2]. Accurate diagnosis of such fractures is critical in directing treatment, predicting prognosis and preventing complications. Generally, radiography is used as a first line investigation to visualise fractures in lame horses. Although two or more projections can be taken, accurate interpretation of such radiographs may be hampered by the complexity of this type of fractures and the anatomical superposition of the bones, a typical feature of radiography. It is well known that computed tomography provides images with a higher contrast resolution than that of radiographs. Also, it produces cross-sectional views of the region of interest, thereby precluding interference as a result of superposition of structures.
On the basis of the known properties of CT and radiography, and the published case reports, we hypothesized that CT provides more detail and information than radiography in diagnosing distal limb fractures. The comparison of radiography and CT in visualising distal limb fractures may provide insight into the potential added value of CT in the diagnosis of this trauma and in directing treatment.

In a retrospective study [3], of 27 horses, diagnosed with distal limb fracture and three negative controls, that underwent radiographic and CT examinations, the level of intermodality and interobserver (intramodality) agreements of four different clinical observers were documented for a predefined set of radiological characteristics (detectable injury, definition of involved bone(s), localisation of injury on the bone, articular involvement, comminution, number of fragments, orientation of the fracture line(s), fracture opening, displacement and presence of small or coalescing cracks), using Cohen's kappa and weighted kappa.

The detection of a fracture and the anatomic localisation showed very good intermodality (IM) and interobserver (IO) agreement levels ($0.8<\text{kappa}<1$). Fracture displacement showed good IM and IO agreement levels ($0.6<\text{kappa}<0.8$). For visualization of articular involvement, fracture comminution and the number of fracture fragments, all agreement levels bordered on the lower limit of good agreement. Documentation of fracture orientation, fracture width and coalescing cracks showed poor ($0<\text{kappa}<0.2$) to fair ($0.2<\text{kappa}<0.4$) IM agreement levels; for each of these three parameters, IO agreement levels were higher for CT than for radiography.

Being able to visualize a presumed fracture or fissure is important [3,4]. Good clinical practice requires every fracture to be evaluated with a detailed description of the relevant anatomy, as subtle differences may influence the treatment approach and prognosis [2,3]. CT offers added value in diagnosing distal limb fractures in horses. Relative to radiography,

the detection of a fracture, defining the fracture orientation and the other fracture characteristics can more appropriately be determined using CT [3].

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