Managing incomplete ossification of the humeral condyle

IN FOCUS

A guide to diagnosing and managing the condition commonly seen in dogs

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Fractures of the humeral condyle are common in the dog. The lateral side is fractured most often (in 34 to 67 percent of cases), with intracondylar fractures (often referred to as “Y” or “T” fractures) less common (26 to 35 percent of cases). Lateral condylar fractures are most prevalent in skeletally immature dogs, whereas medial and intracondylar fractures are usually seen in skeletally mature dogs and are often, but not exclusively, associated with more severe trauma, such as a road traffic accident.

It has been recognised that Spaniel breeds have a high incidence of humeral condylar fractures (Marcellin-Little *et al.*, 1994; Butterworth and Innes, 2001). Often these injuries are in skeletally mature dogs, with unexpectedly low levels of trauma. It is now recognised that some dogs have a sagittal, radiolucent fissure present at the intracondylar isthmus, which separates the medial and lateral parts of the condyle and may extend from the articular surface to, or towards, the supratrochlear foramen (Figure 1). Initial reports revealed these fissures in the contralateral limb of dogs with humeral condylar fractures, but further investigations have shown fissures unilaterally or bilaterally in lame or clinically sound dogs (Marcellin-Little *et al.*, 1994; Butterworth and Innes, 2001).

The exact pathogenesis of this fissure is unclear. Theories suggest failure of fusion of the separate centre of ossification of the distal humerus, gives rise to the condition (incomplete ossification of the humeral condyle, IOHC). It is proposed that normal physiological loading on this weakened condyle may cause the fissure to progress across the physis to the supratrochlear foramen or towards the supratrochlear foramen (Figure 1). Initial reports revealed these fissures in the contralateral limb of dogs with humeral condylar fractures, but further investigations have shown fissures unilaterally or bilaterally in lame or clinically sound dogs (Marcellin-Little *et al.*, 1994; Butterworth and Innes, 2001).

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**Diagnosis**

Diagnosis is based on demonstration of a fissure. To see them, the X-ray beam must be directed parallel to the fissure. Several different craniocaudal projections may be required. An artefactual line may be created by the superimposition of the ulna on the condyle (a “mach line”) (Butterworth and Innes, 2001). Occasionally the fissure may extend only partway across the condyle (a partial fissure). New bone formation can be seen on the lateral epicondylar ridge in response to instability. Normal radiographs do not exclude the presence of a fissure.

Computed tomography (CT) is the gold standard. CT scans reveal the presence of a complete (Figure 2) or incomplete (Figure 3) hypoattenuating area of the condyle. Importantly, CT allows assessment of the elbow joint for other lesions, such as elbow dysplasia and incongruency. In one study, 95 percent of affected dogs had bilateral fissures, with medial coronoid disease in 26 percent and degenerative joint disease in 79 percent of elbows (Marcellin-Little *et al.*, 1994; Butterworth and Innes, 2001).

Dogs with IOHC may present with lameness, condylar fractures secondary to IOHC or as an incidental finding in non-lame dogs. Dogs with fractured condyles are treated with appropriate internal fixation. While the epicondylar ridges tend to heal if stability is provided, the intracondylar region may never heal. In the case of a juvenile with a lateral condylar fracture, we often use a small pin as an antirotation device. In cases of IOHC, we recommend a more robust form of fixation, typically a bone plate spanning the fracture site (Figure 4). As the condylar fissure frequently fails to unite, there is an increased risk of fatigue failure of the transcondylar screw (Figure 5) with subsequent condylar fracture, recurrence of lameness or loss of fracture reduction. For this reason, the largest transcondylar screw that can be safely placed should be used.

**Management**

Management of IOHC must balance the benefits of the procedure against the risk of complications. Surgical stabilisation by transcondylar screw placement aims to resolve lameness and reduce risk of fracture or of developing lameness. In cases of lameness with pain associated with