

Recognize a Common (But Not Well-Known!) Type of Pathological Fracture

If you have not seen this type of fracture, you probably will, at some point. Spaniel breeds, especially English springer spaniels, are prone to a condition called Incomplete Ossification of the Humeral Condyle (IOHC). This is a condition where the normal growth plate present at the junction of the medial and lateral halves of the humeral condyle never ossifies (normal ossification is complete by about 70 days). It remains as a cartilage plate. The AP elbow radiograph here shows this weak spot, as a sagittal lucent line in the center of the condyle.

Why do we care? Normal weight bearing on the distal humerus causes the medial and lateral condyles to move abaxially, that is, outwardly, away from the center of the bone. The force a normal plate dissipates gets transferred to the distal metaphysis of the humerus in a dog with IOHC. The bone hardens over time in order to compensate for the increased strain.

This hardening process results in an orthopedic ticking time bomb, since very stiff bone with abnormal load is a recipe for fracture. The stiff, “Y” shaped metaphysis becomes less able to absorb force than healthy, more “springy” bone. With stress, the force of weight bearing can separate the parts of the condyle along the cartilage plate, the rigid metaphysis of the condyle snaps.

Typically, the patient’s history includes a relatively low trauma incident, such as jumping down from a low height, such as a street curb, although major trauma can also cause the fracture. Occasionally there is a report of a pro-dromal lameness (where the condyle has shifted but not displaced) that preceded the fracture. Both parts of the condyle (so-called “dicondylar”, also “T” or “Y” fracture) or just the medial or lateral part can fracture away from the remaining humerus. If this sounds like a pediatric growth plate kind of fracture, you are correct. The same orientation of fracture can happen in a normal, immature animal, as the ossification has not yet been completed, in effect, also possessing incomplete ossification. In that case, the injury is a Salter 3 or 4 fracture, as it involves the physis and epiphysis (Salter 3) or physis, metaphysis and epiphysis (Salter 4).

How do we manage condylar fractures? These are by definition articular fractures, and must be meticulously reduced and stabilized surgically. Temporary splinting is difficult to do, as proper stabilization requires immobilization of the the shoulder joint. A well-placed Spica splint will do this. Another good option is strict patient confinement, performing surgery as soon as it is feasible based on patient stability.

Exposure is paramount for a good repair of these fractures. Unicondylar fractures can be adequately exposed via a lateral or medial incision, however a dicondylar fracture usually requires either an olecranon osteotomy or a triceps tenotomy to

allow visualization of all fragments.

I always find drilling through this bone to be similar to drilling through cement. I usually dull the drill bit in the process. All that stress I mentioned earlier makes for very dense bone; about the hardest bone we ever drill through. Unicondylar fractures are typically repaired with a horizontal transcondylar screw, and a cross pin or a bone plate on the metaphyseal portion. Although a cross-pin with the transcondylar screw is enough for a young dog with a unicondylar fracture, a dog with an IOHC fracture will have delayed or incomplete healing, and therefore a bone plate and transcondylar screw is a better option, in my opinion. Dicondylar fractures are repaired similarly, using either an additional pin or an additional bone plate to stabilize the second metaphyseal region fracture.

A common concern is the risk of fracture in the contralateral elbow. Old studies suggest an incidence of up to 86% chance of radiographic lucency in contralateral elbow. This was worrisome, as the risk of fracture occurring in the non-operated elbow either during recovery or thereafter seemed quite high. More recent studies using advanced imaging suggest a much lower incidence of bilateral IOHC. Even so, occasionally a transcondylar screw will be placed prophylactically in dogs with non-displaced IOHC (i.e, before the fracture of the metaphysis occurs. This can be done prior to any clinical signs, and potentially prevent fracture altogether.

So, be on the lookout for these dogs. You might recognize the “prodromal” phase where a lameness has developed prior to fracture. We might be able to operate them prior to a displaced fracture! If nothing else, you will know the disease process that caused the fracture when you next see it. You will sound even more smart when you explain why this happened!

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