



# Incomplete Ossification of the Humeral Condyle (IOHC) in Dogs

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## What is IOHC?

The elbow joint in dogs is formed by three bones: the radius, ulna and the humerus. These bones rotate around a cylinder of bone attached to the humerus called the humeral condyle giving a "hinge" type of arrangement.



X-ray of a 7 wk old pup showing the two parts of the humeral condyle (1 & 2) separated by the growth centre (arrowed)



Model of humerus showing the two parts of the condyle to be completely "fused" and the growth centre closed

The cylinder of the humeral condyle develops from two separate parts which "fuse" usually between 8 and 12 weeks of age. This process is called ossification. However, in some pups this process fails to take place leaving an area of cartilage in the middle of the condyle which weakens this region significantly (so called incomplete ossification of the humeral condyle or IOHC).

However, recent work suggests that in some dogs, a stress fracture occurs through previously solid bone of the condyle. This situation is more common in mature dogs over 18 months old. Spaniel breeds, especially Springers, are particularly prone to IOHC/fissure fracture and the condition is likely to have a strong hereditary basis.

## What are the signs of IOHC?

Most dogs suffering from IOHC/fissure fracture exhibit persistent or intermittent forelimb lameness or stiffness particularly after rising. This problem usually responds poorly to standard painkillers and some patients will be reluctant to jump from heights (e.g. from furniture or out the car).

Some dogs suffering IOHC will not exhibit any signs of an issue. In the majority of cases, a pain response will be elicited on manipulation of the affected elbow joint.

## How is IOHC diagnosed?

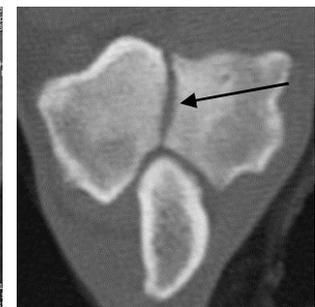
In many cases IOHC can be diagnosed by conventional X-rays of the elbow joint. The red arrow on the X-ray opposite points to the fissure (IOHC) seen as a dark line. However, in many cases, the IOHC will not be visible on conventional X-rays particularly if the fissure or area of IOHC is very small or incomplete



The best way of diagnosing IOHC is to obtain a CT scan of the elbow. This will show whether or not the humeral condyle is normal.



Normal CT scan

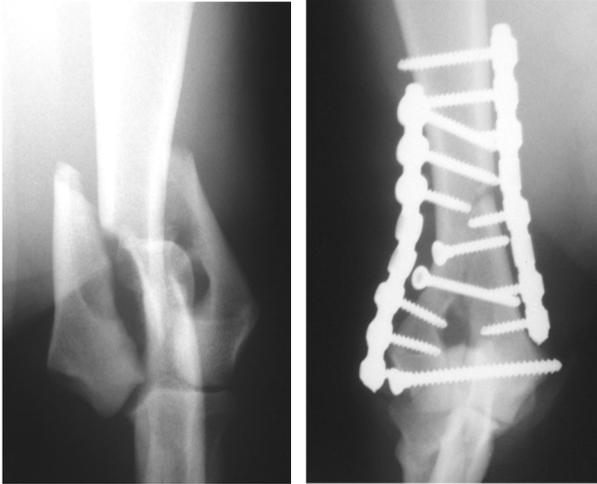


CT scan showing IOHC (arrow)

## Why is IOHC important?

Incomplete ossification of the humeral condyle can cause significant pain and lameness in dogs and limit the affected individual's ability to exercise. Furthermore, the weakness present within the humerus can result in a complete spontaneous fracture during regular activity, such as running in a field or jumping from a low wall. The resulting fracture can be in the form of a lateral condylar (two piece) or bi-condylar "Y" (three piece) fracture.

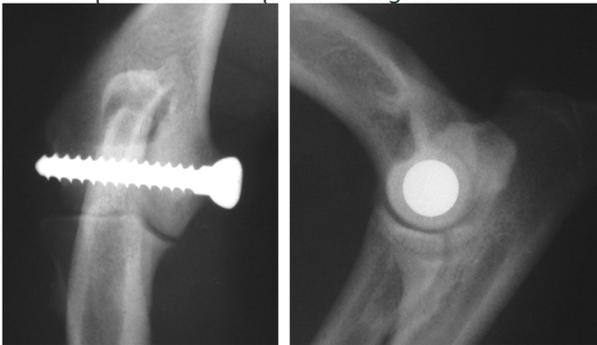
These types of fractures can be difficult to repair and occasionally treatment is not possible because the break is so severe. The only option in this situation being amputation or sadly even euthanasia.



Bi-condylar "Y" fracture repaired with plate and screws in a patient previously suffering IOHC

### How is IOHC treated?

If the patient is not lame or suffering problems related to the IOHC, treatment is not necessary. However, in the majority of cases, we would recommend surgery to resolve pain caused by the abnormality, to restore the patient to soundness and remove the possibility of a complete fracture occurring in the future. Our current protocol is to place a large screw



across the condyle to stabilise the IOHC and to strengthen the area. Other types of treatment have been tried such as placing bone grafts into the region but these have not been proven to give a better outcome than traditional screw placement.

IOHC treated with a single large screw: The X-ray on the left shows a front to back view and the right X-ray shows a side on view

### What are the risks of surgery?

The risks of surgery includes anaesthetising the patient to facilitate surgery. However, with modern drugs and techniques and close monitoring of the patient anaesthetic complications thankfully are very rare. Post operative infection and soft tissue swelling were previously common after surgery to treat IOHC. However, at the East Neuk Vet Clinic we have pioneered the placement of "in to out" direction of the screw position (instead of the traditional "out to in") and we have since seen the incidence of post-operative issues to have reduced dramatically. We have published this work recently.

Since we do not expect the area of incomplete ossification or fissure fracture to fuse or "heal", the screw is constantly subjected to stress and loading. This can lead to metal fatigue and ultimately breakage and the patient will become lame again (or in the worst case the humeral condyle could fracture completely).



This complication can occur month to years after the original surgery. A revision operation is usually necessary to repair the fracture or to replace the broken screw. To reduce the slim chance of screw breakage, we try and place as large a diameter of screw as possible.

### What is the prognosis after surgery?

The outlook after IOHC surgery is usually good to excellent with most patients returning to full soundness and active exercise within 6-8 weeks post-operatively. Most patients suffering from IOHC will develop osteoarthritis (despite surgery) in the longer term but this is usually mild and does not cause any significant issues apart from mild stiffness after resting after activity.

