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## FRACTURES OF THE ELBOW

### Fractures of the Humeral

Fractures involving all or part of the humeral condyle are often difficult to manage due to involvement and proximity of the joint and the problems posed by the complex anatomical structure of the distal humerus, especially in the supra-condylar area. Fractures involving the joint surface all carry a guarded prognosis due to stiffness, lameness and high levels of post-traumatic arthritis after surgery (Gordon et al, 2003).

1. Fracture of the Humeral Condyle
2. Y or T fracture of the distal humerus
3. Fracture complicated by Incomplete Ossification (IOHC)

### Considerations with Surgical Approaches to the area

Visualisation of fractures in the distal humeral and condylar areas can be difficult and manipulation and reduction of bone fragments challenging. In addition the requirement to achieve excellent reduction of the intra-condylar portion of the fracture with implants placed so that they do not interfere with the joint can mean that an extensive surgical approach is made to this area. This often involves osteotomy of the olecranon to mobilise the triceps m. away from the surgical site. In many situations, especially when the fracture is complex, this is completely necessary to allow reconstruction and stabilisation. However this osteotomy combined with extensive soft tissue damage may contribute to poor post-operative limb use and subsequent problems over the longer term giving a poor final outcome<sup>1</sup>. Whenever it is possible a bilateral muscle spreading technique should be employed to access the fracture without osteotomy. This has been found to counteract many of the post-operative problems of the more extended approach.

### Stabilising the Fracture(s)

Reconstruction of any intra-articular fracture is a necessity and rigid splinting of any supracondylar fracture with strong implants also is vital to promote early pain free mobilisation of the joint. These are therefore the main targets for fixation.

### *Intra-Condylar Fractures*

Intercondylar stabilisation is usually achieved by using a single lag screw supplemented by an anti-rotation wire. The positioning of this screw is critical and it is often prepared by an inside-out technique where the first hole is drilled out from the fracture surface. Uncomplicated humeral condylar fractures are commonly found affecting the lateral portion of the condyle in immature dogs (especially spaniels and terriers). Soft bone in these young dogs is an additional consideration during surgery.

### *Supracondylar Stabilisation*

Supracondylar stability is often obtained by using one or two bone plates. Sufficient screws to ensure that the condyle is secure can be achieved by using two plates in combination especially when bone stock is limited. In situations where there are additional problems due to extensive soft tissue damage in high energy fractures, intercurrent life threatening disease or injury or in cases where the supra-condylar area is simply unable to be reconstructed a different approach may be followed. External skeletal fixation can be used to provide stability provided any articular fractures are reconstructed. This can lead to a much shorter surgical period with less biological invasion. Early limb use should still be possible in these difficult situations.

### **Incomplete Ossification of the Humeral Condyle (IOHC)**

This has been described as a predisposing cause of intra-articular fracture in certain breeds, predominately spaniels<sup>2,3</sup> and unfortunately affects the healing potential of the fracture when present. It is helpful to know if this situation is present when dealing with a fracture in one of the target breeds. This may not be easy as it is difficult to visualise the defect unless there is access to CT. Screening affected dogs by obtaining a CT of the contra-lateral elbow gives a high success as the condition is bilateral in most cases. Insufficient information has been published on the best way to manage this problem whether it be as a simple intra-condylar fracture or in a more complex Y fracture. There is little doubt that the healing of the fracture is slowed and may not occur at all leading to fatigue and failure of the implants and 're-fracture'. For these reasons when this condition is identified the largest implant that can be positioned, usually a 4.5mm screw, is selected to stabilise the intra-articular fracture. This is supplemented with

a medially placed buttress plate by many surgeons and a guarded prognosis given. A screw is often also placed across the unfractured contra-lateral condyle at the same time to prevent subsequent fracture, especially in early recovery period.

### **Fractures of the Proximal Ulna / Olecranon**

These can be either intra or extra-articular. Intra-articular fractures are located proximal to the trochlear notch and add an extra challenge to surgery as they require to be reconstructed exactly. In both situations the function of the elbow is disrupted by loss of the triceps function and the other main consideration for surgery is to counter the pull of this muscle during the repair phase.

### **Management Guidelines**

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|------------------------------------|---|
| 1. Simple Extra-articular Fracture | Tension band Wire   |
| 2. Simple Intra-articular Fracture | Tension band Wire or Plate  |
| 3. Comminuted Intra-articular      | Reconstruction and perhaps Buttress Plate   |
| 4. Monteggia Fracture              | In these cases fracture is accompanied by displacement of the radial head.<br>i) lag screw ulna to radius (+plate or ESF)<br>ii) Reconstruct annular ligament |

Plate application to the ulna is often made on the caudal surface where it can act as a tension band. In some cases application to the lateral surface is preferred especially if comminuted.

### **References**

1. Gordon WJ, Besancon MF, Conzemius MG et al., Frequency of post-traumatic osteoarthritis in dogs after repair of a humeral condylar fracture.2003; VCOT 16; 1-5
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