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## FRACTURES OF THE STIFLE

Fractures involving the stifle joint are most commonly found in immature animals. There are a wide variety of fracture types involving the distal femur, proximal tibia and patella. Detailed radiographic investigations are required to provide exact definition of the fracture and allow the surgeon to select the most appropriate method of fixation. Clinical findings on initial examination may be limited due to swelling associated with the fracture and pain experienced by the patient. It is however essential, to clinically evaluate both the soft tissue and bony structures in the joint. When fractures are present accurate reduction (especially if the joint surface is involved), proper regard for functional growth plates and careful handling of small fragments of bone, are of prime importance. Fracture stabilisation is achieved by basic principles. Since many of these animals are immature, bone healing will be optimal and fracture healing is normally not a problem.

### Fracture of the Distal Femur

#### *i) Supracondylar Fracture of the Femur*

This is the most commonly seen fracture affecting the joint and is generally found in dogs 6-12 months of age and in cats up to 2yrs. A history of trauma either directly from a blow or following a fall may be provided. The animal is non weight-bearing on the affected limb and the joint is grossly swollen. Radiographs must be obtained to confirm the diagnosis. A lateral view of the stifle is the most useful film to establish this. It is essential that a cranio-caudal view should also be obtained to ensure that there is not an accompanying inter-condylar fracture.

#### **Management**

These fractures should be dealt with as rapidly as is reasonably possible. If fixation is delayed remodelling will occur and the bones may be fixed in the wrong location by the rapid production of a healing callus thus necessitating surgical break-down and the possibility of further damage. Early reduction is simple and achieved by fixing the fracture site and then carefully pushing the epiphysis forward so that it toggles into position when the fracture is moved into extension.

Factors affecting the selection of method of stabilisation are:

- The age of the animal and therefore the remaining growth potential.
- The small size of epiphysis.
- Minimal compromise of the articular surface by implants

Reduction and stabilisation can be affected by many methods both closed and open. In younger animals the use of Rush pins, parallel placed K wires, crossed K-wires or a bone plate are all methods which give good stability. Rush pins and parallel K wires give minimal compromise to growth plate function. Specially designed condylar plates may be used in older or chondrodystrophoid animals. It is important whichever method is selected, to achieve accurate reduction of the fracture. Under-reduction of the fracture may lead to limited joint movement or fracture failure with re-displacement of the epiphysis caudally.

#### *ii) Y or T Fractures of the Distal Femur*

These are encountered in immature animals. Cats or small breed dogs seem most prone to this injury. Clinically there may be swelling of the joint and movement may be accompanied by crepitus and pain. Radiographs will reveal the true extent of the injury and it is particularly important to differentiate these from simple supra-condylar fractures before surgery is commenced. These fractures are often un-displaced and require careful inspection of the pre-op films to confirm the diagnosis. Surgery involves reconstruction of the distal femoral condyle using pins and screws. Particular attention must be paid to obtaining accurate reduction of articular fractures. In most cases reduction of the intercondylar fracture or fractures is attempted first then the supra-condylar fracture is stabilised as described above.

#### *iii) Single Condylar Fractures of the Femur*

This type of fracture is encountered occasionally in working dogs where the medial condyle is involved. Affected animals are presented with a history of trauma to the joint, either direct or torsional. A common presenting history is that the patient has trapped the leg and been suspended from a gate or a fence. The animals are usually young adults in which the epiphyses have closed.

The main clinical features are swelling and severe pain on manipulation of the joint. It is often impossible to examine the joint without anaesthetising the animal. In the relaxed dog, instability will be detected which manifests itself as collapse of the joint on the medial aspect. This must be differentiated from opening of the joint on the lateral side associated with lateral collateral ligament rupture, which can feel very similar clinically. A lateral view radiograph will reveal that the medial condyle has displaced caudally.

### **Management**

The method of choice in a large dog is to pre-drill the femur prior to fracture reduction allowing the retrograde placement of a lag-screw once the condyle has been levered into position. In small dogs the fragment can be held by 2 or 3 K-wires.

### **Fractures of the Proximal Tibia**

Fractures of the proximal tibia are again usually encountered in the immature animal. Fracture types seen are:-

1. Avulsion of Tibial Tuberosity.
2. Separation of Tibial Plate (Salter Type 1 or 2)
3. Separation of part of Tibial Plate (Salter Type 3)

**1. Avulsion of the Tibial Tuberosity** is most commonly seen in greyhounds or terriers 4-7 months old but can occur in any kind of dog. The injury usually occurs as the pup is running or playing and is the result of the quadriceps muscle contracting against an immobile tibia. This results in avulsion of the ligament attachment with the tibial tuberosity. Clinically there will be lameness and swelling of the stifle. The leg is usually carried and palpation may reveal pain over the region of the tibial crest. The patella may be found located more proximally than one would expect and a gap may be palpable between the tibial crest and the remainder of the tibia.

Confirmation of diagnosis is achieved by a lateral radiograph of the stifle which will also reveal the degree of displacement present.

Management is dependent upon the degree of displacement. If the crest is only mildly displaced then resting the pup by confinement for 1-2 weeks may allow healing to

take place. In cases where marked displacement is present surgical replacement and stabilisation using paired K-wires and a tension band allows good healing of the fracture whilst neutralising the distractive pull of the quadriceps. Fixation should be removed when the fracture has healed. In young greyhounds (4-5m) pins alone may be used to try and prevent premature fusion of the tibial tuberosity.

**2. Fractures of the tibial epiphysis** can be confused with tibial crest avulsion. The tibial plate usually displaces caudally and medially or laterally. Careful inspection of radiographs is necessary as this condition is often missed. Fracture of the proximal fibula is often an accompanying problem which can be used to assist diagnosis. Once diagnosis has been confirmed open reduction should be undertaken. This is best achieved via a medial arthrotomy. Stability following reduction can be produced by a variety of means such as crossed pins, single IM pin or Rush pins. The prognosis is generally good. If the presentation is delayed and partial healing has occurred then conservative management should be considered, especially if fibula is intact.

**3. Salter type 3 fractures of the tibial epiphysis** must be accurately reduced and held in position with K-wires or a small lag screw.

### **Other Fractures**

Fractures of the patella are uncommon but are difficult to manage due to the forces acting on the bone. Avulsion of the anterior cruciate ligament and long digital extensor tendon can occur in young animals. Early intervention may allow reduction and stabilisation of these small fragments using pins and wires.