

Bone Fixation Options – what they really mean

In the event of your pet fracturing it's leg, you may be offered a range of repair options, and in the "heat of the moment" it may be difficult to fully understand each one, and importantly how each may affect the prognosis (success rate).

Note that the preliminary diagnosis of any fracture - even after x-rays – can change as bone density (weak bones) or micro-fractures can change the whole approach and prognosis at any stage.

Note that tubular bones are those bones that have a round structure with a hollow centre – like most main leg bones. Flat bones are just that – like the pelvis, jaw, skull and shoulder blade.

Starting at the "top"

Bone Plating / Screwing

This is simply a large strong metal bar that is screwed to the bone. The surgery required is involved and utilises a lot of equipment. The plate and screws are specialist orthopaedic stainless steel and for a medium sized dog the plate and screws alone can be \$200 - \$400.

Advantages – strong reliable fixation. Provides stability against bending, compression and rotation. Post operative care easier than alternatives (still important however). Suitable for flat bones and tubular bones. Can often be left in place.

Disadvantages – splintered bones – not large enough to place a screw, unsuitable in open or infected wounds, involved surgery and expensive.

External Fixateur

Scaffolding – pins are driven transversely through the bone, and then these pins are held together by other pins running outside of the leg, looking like scaffolding on a building. Suitable for flat bones and tubular bones.

Advantages – tremendous for open or infected wounds (no pieces of steel cross the contaminated area). Good stability for bending, rotation and compression.

Disadvantages – clumsy, post-operative care critical. Expensive and involved procedure. Always needs removing – but this is a simple procedure.

Intramedullary Pinning

A steel bone pin is placed along the hollow bone cavity across the fracture site. Often augmented by using stainless wire loops to hold fragments in place. Suitable for certain tubular bones only.

Advantages – relatively simple procedure – compared to the above alternatives. Implant is cheaper. Provides good stability against bending. Ok for minor splintering of the bone.

Disadvantages – as the pin is a smooth round piece of steel, it has no rotational, tensional or compression stability at all. Only the nature of the bones and fracture provide this – and if the bones are soft or the fracture is of an unsuitable nature, failure rate can be high. Post operative care/rest is critical. Only suitable for humerus, femur and tibial fractures (owing to the anatomy of those bones). Almost always require removing. Not suitable for open or infected wounds.

Cross Pinning

Only for fractures very close to the end of certain bones (Supracondylar fractures). These fractures almost always occur only in young growing patients. Two intramedullary pins are placed in an "X" pattern across the fracture site.

Advantages – stability is excellent, return to use is rapid. Implants are quite cheap.

Disadvantages – operation is inside the joint, so risk of arthritis exists – but that is where the fracture is so have to go there anyway. It is imperative to remove the pins after about 6 weeks or shortening of the leg can occur- and pin removal is difficult, so be ready for another operation. If the fracture is more than 24-48 hours old, it is a very difficult operation to perform.

“K” or Kirschner Wires

These are small flexible intramedullary pins used for small bones or fragments.

Pin and Tension Band

Use of an intramedullary pin with a stainless surgery wire used to compress the fracture site along the pin. Useful for attaching a fragment of bone torn off the main bone by a ligament or tendon – an “avulsion” fracture. An example is the patella or kneecap tendon pulling off the front of the tibia.

Advantage – stability, cheap implants.

It is a specialised use operation, and disadvantages are not really a problem.

Cast

A seemingly simple principal with many flaws. A cast can only work if

- the joints at either end of the fractured bone are immobilised – restricts to lower leg only
- the fracture is able to be reduced externally.
- the fracture is not oblique(angled) such that it collapses lengthwise inside the cast

Added to that is the fact that the cast needs to be kept clean and dry, and be removed and replaced at least once during the healing period. As the initial swelling comes down in the leg, the cast will loosen requiring refitting.

Advantages – initially cheaper. Quick, non-invasive.

Disadvantages – long term as expensive as other operative techniques once changes begin to add up. Patient's do not respect cast, male dogs often urinate on cast. They are in no way waterproof. Extremely limited in the type of fractures they can help. Leg is covered so it is not possible to easily see how things are going.

Amputation

Amputations are carried out high on the leg – it is a real disadvantage to leave a non functional section of the leg – we are not going to create a prosthesis, so it is better for the patient to have the entire leg removed.

Advantages – after care – the patient is usually ok within days. Not as expensive as a reconstructive fracture repair. Cats and dogs up to 20kg get on very well with three legs – especially if the amputation is a hindlimb.

Disadvantages – the obvious – one limb lost. Not ideal for heavier patients, especially if active.