



Figure 58-22. Kirschner wires are used with this technique by retrograde placement. The wires are started from an extra-articular position just proximal to the metacarpophalangeal joint. The points of the Kirschner wires extend to just below radial carpal bone articular cartilage.

may still bear weight on the side of the paw and a protective boot may be necessary. In Brachial plexus injuries the patient must be able to extend the elbow in order to make the procedure worthwhile. Fusing the carpus in severe brachial plexus injuries with a nonfunctional elbow will not have any benefit.

Procedure

In a pancarpal arthrodesis, the antebrachio-carpal, middle carpal, and carpometacarpal joints are included. It has been reported that fusing only the antebrachio-carpal joint and not the distal joints will lead to degenerative joint disease of the latter due to excessive stress. All the cartilage in these joints must be removed with a power burr or curette. The fascia, joint capsule and inter-carpal ligaments must be incised to expose the cartilage. With a dorsal approach the cephalic and accessory cephalic veins and the common digital extensor tendons must be retracted but the extensor carpi radialis and abductor pollicis longus tendons can be sacrificed to expose the intercarpal and carpometacarpal joints. Some form of graft material should be placed between the denuded joint surfaces. Autogenous cancellous chips are the best but there are now numerous choices from freeze dried, decalcified, cancellous allograft to artificial Ca Phosphate substitutes. The carpus is fixed in 5 to 15 degrees of dorsiflexion to place the foot in a more natural weight bearing position.

Plate fixation is the most commonly used method although external fixators and even cross pins have been advocated. Both plates and external skeletal fixation are acceptable methods of providing

Pancarpal Arthrodesis

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Indications

The primary indication for pancarpal arthrodesis is irreparable damage to the articular surfaces of the antebrachio-carpal joint or the soft tissues around the joint that causes intractable pain and loss of limb function. This damage may be from trauma, infection or arthritis. Examples of trauma would be highly comminuted fractures of the articular surface or fracture luxations with significant soft tissue and or bone loss where a primary repair would still be unstable. Severe cartilage damage can also result from chronic osteoarthritis, infection from septic arthritis or open, infected fracture luxations. Rheumatoid arthritis, seen mostly in small breeds, causes severe ligamentous instability that does not respond well to soft tissue repairs. Pancarpal arthrodesis is effective in these cases but the disease may affect multiple joints. Partial carpal arthrodesis is sufficient in those cases with hyperextension injuries where the antebrachio-carpal joint is not damaged.

There are other less common indications for pancarpal arthrodesis. It is used to increase purchase for a plate in the fore leg with atrophic nonunions of the radius and ulna in miniature breeds, and limb salvage procedures for Osteosarcoma treatment. In both of these cases there is not enough distal radius to anchor a plate. Arthrodesis allows the plate or External Skeletal Fixator to extend down to the metacarpal bones. Radial paralysis and mild brachial plexus injuries can be treated with a pancarpal arthrodesis. Pure radial paralysis is rare. There are other treatments such as muscle transfers, but pancarpal arthrodesis to keep the paw in the proper orientation is one alternative. These animals

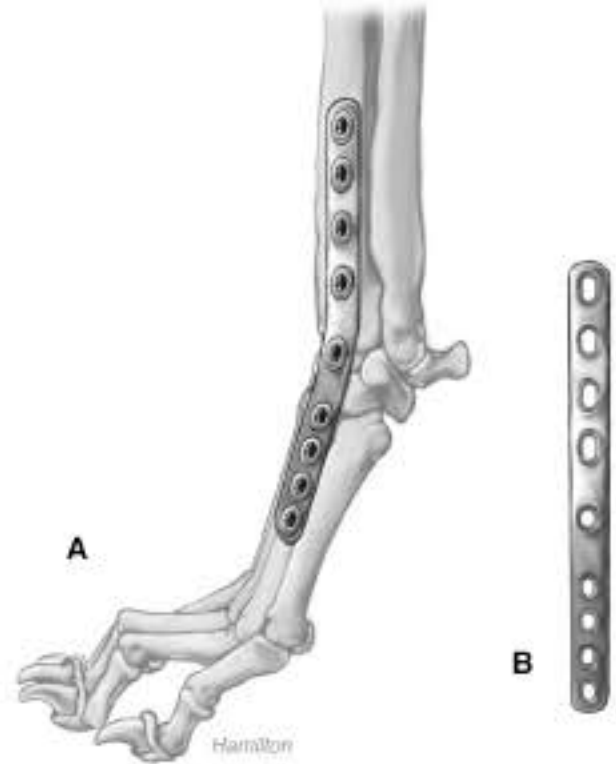


Figure 58-23. A. The preferred method of pancarpal arthrodesis is a plate with at least 3 to 4 screws in the radius, 1 in the radial carpal bone, and 3 more in the third or fourth metacarpal bone. The carpus is placed in 5 to 15 degrees of extension. B. Newer plates allow downsizing of screws to be placed in the metacarpals.

stable long term fixation. External fixators have an advantage in type III open fractures or at the site of an infection. No metal is buried and it is possible to treat the open wounds around the fixation. A type II, or rarely, a type III ESF can be used. Ring fixators and hybrids are also an effective choice in these situations. In clean, uncomplicated cases plates are usually the preferred implant and are better tolerated during the long periods required for arthrodesis. DCP plates also have the advantage of applying compression across multiple joint surfaces. The plate is placed dorsally (Figure 58-24) in most cases. The plate can also be placed ventrally, which is the tension band side, although this approach is much more difficult and involved (Figure 58-25). There is also a recent report in which the plate is placed on the medial aspect of the radius and carpus. This placement removes the plate from the compression side of the fixation. The newer locking plates can be contoured in four directions allowing the 10 to 15 degrees of dorsiflexion with a medial plate. By far the most commonly used position is dorsal. Three or four screws are placed in the radius, one in the radiocarpal bone to pull it up to the plate, and at least 3 in the 3rd or 4th metacarpal bone. Depending upon how the plate lays on the radius and intercarpals it may line up on either the 3rd or 4th metacarpal. Some newer plates taper down distally permitting the use of smaller screws for the metacarpal bones. For example a 3.5 mm screw and plate over the radius and radiocarpal bone and 2.7 mm screws for the metacarpal bone. Others allow placement of screws in both the 3rd and 4th metacarpals.

A cast is usually added to plate fixation since there is no worry about joint stiffness and it adds a measure of safety. The cast can be left on until radiographic signs of fusion are seen, or removed at the discretion of the surgeon in a smaller quieter patient. The plates are rarely removed but fractures at the end of the plate are a concern in large active patients.



Figure 58-24. Placing the plate on the medial side but allowing 5 to 15 degrees of extension requires a plate to be contoured in two planes. The newer locking plates allow this.

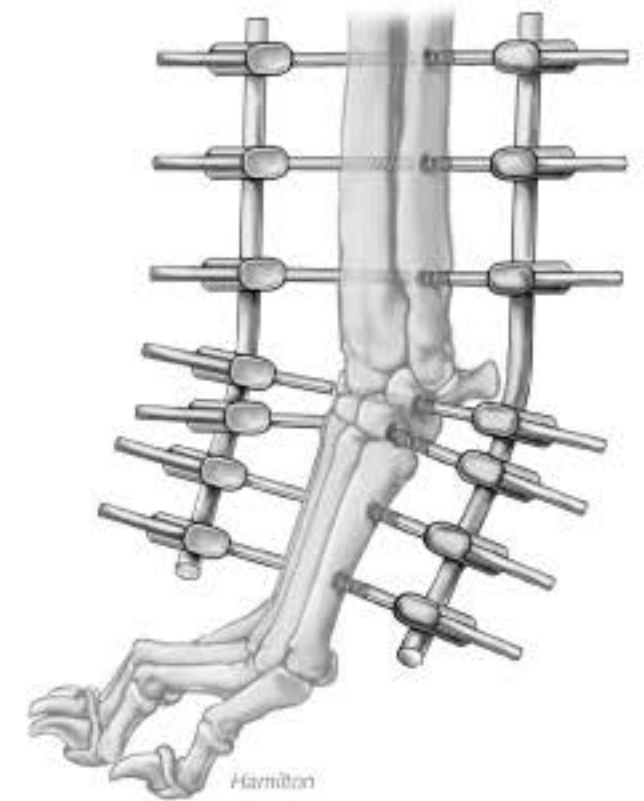


Figure 58-25. External skeletal fixators, ring fixators or hybrids work well as an alternative to plates especially in the presence of infection or major soft tissue damage.

Suggested Readings

Chambers JN, Bjorling DE: Palmar surface plating for arthrodesis of the canine carpus. *J Am Anim Hosp Assoc* 18:1875. 1982.
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Repair of Fractures Involving Metabones and Phalanges

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Introduction

Metacarpal and metatarsal fractures are a common injury in small animals. Although they can occur from direct trauma or from a collision against a stationary object, other causes are recognized. Entrapment of the paw while leverage is applied to the area or a fall can cause the fractures. Fractures caused by falls usually have associated hyperextension injuries.