

# Carpal arthrodesis

## What is carpal arthrodesis?

Arthrodesis is a surgical procedure that permanently fuses a joint. Two basic types of arthrodesis are performed in the carpal region. Pancarpal arthrodesis (PCA) is most commonly employed to treat carpal injuries and involves surgical fusion of all three joint levels: the antebrachiocarpal, the middle carpal, and the carpometacarpal joints. Partial arthrodesis involves fusion of only the middle and distal carpal joints.



Partial carpal arthrodesis is used less commonly; intuitively it seems a better approach for injuries that involve **only** the middle and distal joints as movement of the antebrachiocarpal joint (the major joint of the carpus; our wrist joint) is preserved, and gait may be minimally affected. In contrast, pancarpal arthrodesis also fuses the antebrachiocarpal joint eliminating all movement thus permanently altering gait. Unfortunately, a proportion of dogs undergoing partial arthrodesis have ongoing lameness. This may be due to undetected injury to the antebrachial joint due to difficulties of accurately identifying all levels of joint involvement, or due to the cranial aspect of the radius impacting on the edge of the bone plate (in some dogs the antebrachiocarpal joint extends to such a degree this may be unavoidable). Some dogs initially undergoing partial arthrodesis will therefore require further surgery to fuse the antebrachiocarpal joint, and/or remove the plate/s. For these reasons many surgeons prefer to perform pancarpal arthrodesis in every case.

Carpal arthrodesis involves removing the cartilage within the joints before packing them with bone graft/bone products. Fixation is typically performed with bone plates and screws, although pins and external skeletal fixators may be used. In some cases, a bandage, splint, cast or removable carpal brace may be applied to protect the plates/pins for an extended period.

## Indications

Pancarpal arthrodesis is typically indicated for the following conditions:

- Severe osteoarthritis: When conservative treatments such as medications and physical therapy fail to manage the pain and disability caused by advanced degenerative joint disease.
- Joint instability: Due to previous ligament injuries or fractures that compromise the stability and function of the carpal joint.
- Traumatic injuries: Hyperextension injuries of the carpus cause substantial injury and typically occur following a fall or an awkward landing after jumping. Typically, there is severe damage to palmar ligaments and fibrocartilage. Damage may occur at one or several levels of the carpus. It is not always possible to accurately identify whether one or several levels are involved, particularly if there is severe disruption at one level and milder injury to another level or levels. Serious injuries of the carpus may also occur after tripping/catching a paw in a hole, or sudden changes in direction at speed.

## Outcome and potential risks of surgery

Pancarpal arthrodesis (PCA) typically has a good outcome; in one study 97% of owners reported improvement in gait and 74% reported excellent limb function, despite a permanent alteration in gait. Long-term assessment of PCA has also been reported in 12 working dogs; six dogs were able to complete normal work duties whereas 4 were able to perform most duties, with most owners satisfied with the outcome. The results for partial arthrodesis are more variable. Dogs that do well may have essentially normal antebrachiocarpal joint function and a relatively normal gait, however some dogs have persistent lameness and require further surgery.

Complications post–carpal arthrodesis are numerous, including implant failures, infection, persistent discomfort, fracture, swelling and wound dehiscence. Complication rates reported in the literature range from 14% to 50%.

- Soft tissue swelling +/- oozing is common in the post-operative period. In more severe cases wound breakdown (dehiscence) may occur. Frequent bandage changes may be required in the post-operative period.
- Infection is more common compared to other orthopaedic procedures with reported rates ranging from 7% to 66%. Pre-existing medical conditions or contamination of the wound in the early post-operative period will further increase infection risk e.g. your dog licking the wound in the days after surgery.
- Excessive early activity increases the risk of damaging or breaking the plate or screws, or fracturing bones (especially the metacarpal bone at the lower end of the plate).
- Fusion of the carpus may be delayed, prolonging the period of confinement necessary. Some areas of the carpus may fail to fuse, which may cause persistent lameness. Revision surgery may be necessary.
- Progressive degeneration of the antebrachio-carpal joint (“wrist”) has been reported in 36% of cases of **partial** carpal arthrodesis.
- Irritation from the plate not uncommonly necessitates plate removal. The presence of the plate also increases the risk of distal metacarpal fracture; plate removal may be advisable once the carpus has completely fused.
- Bandages, splints and casts not uncommonly result in pressure sores. The incidence and severity of pressure sores is reduced by strict confinement. Pressure within bandages/splints/casts may rarely increase enough to restrict blood supply e.g. limb swelling resulting in a "tighter" cast. If the blood supply is restricted for long enough it may result in loss of skin, digits or even the entire bandaged portion of the limb. Regular monitoring (e.g. squeezing toes and assessing response morning & evening) minimises the risk of this rare but potentially catastrophic complication. Cast-related complications post-PCA have been reported in up to 44.4% of cases.

## Postoperative care

Ice packs are helpful following surgery (when not bandaged). Medications e.g., Pain killers will be dispensed.

Confine appropriately to **eliminate all running and jumping** for at least 12 weeks; chose appropriate confinement to achieve this for your dog; cage confinement is advised. Short **leash** walks in the garden (a few minutes four to six times daily) are recommended to allow toileting. Keep your dog at your side; use a lead of no more than 1-metre length.

X-rays are typically performed six to eight weeks following surgery to assess implants and degree of healing. Further X-rays are typically taken at 12 to 14 weeks +/- 16 to 18 weeks post -surgery.

If a bandage/splint/cast has been applied, it must be carefully looked after (detailed instructions will be provided).

## Declaration

I have read the preceding information and am satisfied I have a sufficient understanding of pancarpal arthrodesis including potential complications that may occur and requirements for aftercare following surgery.

Owner’s name:

Dog’s Name:

Owner’s signature:

Date: