

ARTHRODESIS (partial vs pan) - Client/Patient Information

The carpus (wrist) of the dog can obtain severe injuries that require fusion of the joint. The surgery to fuse the joint is called carpal arthrodesis.

Most often, the original trauma is a hyperextension injury. Hypertension injuries to the carpus are usually associated with a history of a fall or jump. Within a few days dogs frequently improve, but develop a seal-like or plantigrade stance. The structures supporting the normal angular ion of the carpus, the palmar ligaments & fibrocartilage as well as the flexor carpi ulnar is tendon are usually severely damaged, leading to the typical presentation. Conservative treatment such as application of a splint or medical therapy is not successful to treat this condition. Surgery is the best treatment. Other trauma such as a fracture of the bones formation the joint can also lead to chronic pain & decreased function of this joint. Severe arthritis can also be a painful condition & indication to perform an arthrodesis surgical procedure.

Surgery consists of removal of all joint cartilage, placement of a bone graft into the joint spaces & application of a specifically designed bone plate. In specific cases, a splint & a soft cast padding bandage may be necessary for 4-8 weeks to supplement support. The splint & bandage changes are typically change initially within 1-3 days then 3-5 days then every 5-7 days dependent on the condition of the splint/bandage & how the patient recovery & clinical outcome has been progressing. This is dependent on arthrodesis plate selection, type of injury, severity of injury & surgical technique. There is no major time frame or formulation for splint/bandage changes. If you notice anything that appears to be abnormal, you must go have the operated leg examine immediately.

Bandage & suture removal is recommended at 2 weeks after the surgery. Exercise is limited to short leash walks only for a minimum of 8-12 weeks. Radiographs will be taken at that time depending on the bone healing progress, it will be determined if further restricted activity is indicated or additional radiographs are needed later.

Although there is usually good level of function after healing has occurred, occasionally dogs show some circumspection of the leg during the swing phase of walking (ambulatory). This is normal because of the lost amount of motion of the carpal (wrist) joint. Plate removal is frequently necessary in the future after bone healing has occurred because screws may loosen & lead to irritation. The bone remains strong after plate removal.

Complications after pancarpal arthrodesis may include, but are not limited to severe swelling after surgery, pressure sores from the bandage, infection, max-or non-union, implant breakage or loosening, fracture of the humerus at the site of the bone graft harvesting or implant related lameness. Arthrodesis does have a higher rate of complications compare to other orthopedic - bone related surgeries; however, pets can have a fair to good outcome if aftercare recommendations are followed. Despite possible complications, healthy dogs that undergo appropriate post-operative care have a good healing potential. The activity level & quality of life for pets that underwent an arthrodesis once fusion has occurred is fair to good.



ARTHRODESIS (partial vs pan) - Discharge Information

Discharge Instructions – Carpal Joint / Bone Injury

Surgery: Surgical arthrodesis (fusion) of the carpus & stabilized with a bone plate & screws.

Prognosis: Your pet has a good chance to make a full recovery.

Convalescent period: Weight bearing is typically seen within the first week after surgery. By 2 to 3 months after the surgery the lameness should have resolved. Please give us a call if your companion stops using the operated limb. Please note that your pet's gait on the operated limb will not be perfectly normal, but pain from the hyperextension injury will be relieved after the bone has healed together.

Diet: If your companion will not eat the regular diet, a homemade bland diet (50:50) mix of lean hamburger, chicken breast, lean turkey meat & a carbohydrate source such as rice, potato, or pasta) should be offered for 3 days & then wean back onto the regular diet over the next three days.

Bowel movements: Your companion may not have a bowel movement for the next 4 days after surgery. If your companion does not have a bowel movement after 4 days or is straining to defecate, constipation may be present. Unflavored Metamucil or Miralax at a dose of 1 teaspoon/50 lbs body weight can be mixed in canned food (in each meal) as a laxative. If this treatment is not effective, other laxatives can be prescribed.

Exercise:

1. Cover all slippery floors with throw rugs or indoor/outdoor turf carpet for the first 8 weeks after surgery.
2. Limit activity to very short leash walks for bowel & urinary purposes until the bone is healed (typically 8 weeks). Do not leave your companion off the leash for 3 months or as recommended by the surgeon. No jumping, climbing stairs or rough-housing with other pets or people. Strenuous activity may result in failure of the surgical implants to hold the fracture together.

Cast with inner padding bandage:

1. The cast will support the limb during the healing process. We estimate that the limb will need to be supported for a total of 8 weeks; duration of casting will be determined by your pet's surgeon.
2. Please check for the following warning signs of a problem that needs immediate attention by us or your primary care veterinarian:
 - Paw swelling, if significant can cause the circulation to be cut off from the paw & death of the paw tissues. Please check to make sure that the two middle toenails are touching each other; if they are, the paw is not swollen.
 - Cold toes may indicate poor circulation of the paw. Put your pinky finger in the end of the cast & make sure that the toes are warm.
 - A pet chewing or licking at the cast may indicate that there are pressure sores
 - A foul odor from the bandage may indicate an infection
 - Blood or discharge staining through the cast may indicate a pressure sore or infection - Sudden worsening lameness of the casted limb

Please call us if any of these problems are noted.

Incision: After the cast is removed, please check the incision for signs of infection: redness, swelling, pain or discharge & call if these are noted.

Follow-up examinations:

1. The padding material on the inside of the cast will need to be changed at least every 1-2 weeks; the cast is likely a clam shell & this part will be reused during the entire period of casting unless it gets worn. If

sores develop on the casted paw, cast changes will need to be done more frequently (as determined by the doctor).

- Please make an appointment for the next cast change with your primary care veterinarian.

2. Radiographs (x-ray) of the operated limb should be done in 8 weeks to check the healing process at primary care veterinarian.

- Please schedule your appointments ahead of time, as our schedule fills quickly

IV catheter bandage: Your companion had an intravenous catheter for the administration of IV fluids during anesthesia. The catheter has been removed & a small bandage has been placed over the site (typically on the lower part of a front or hind limb) to prevent bleeding.

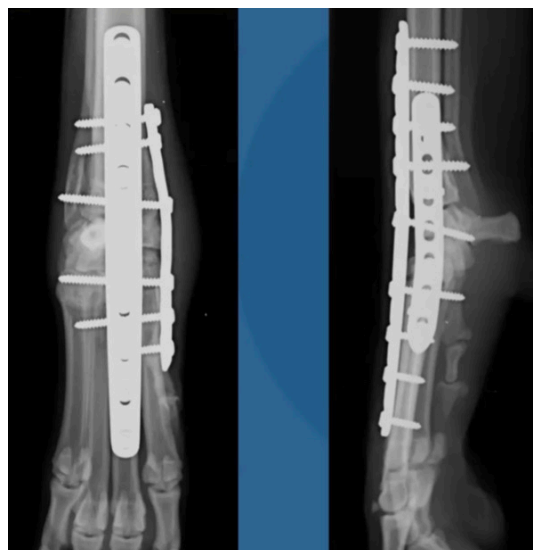
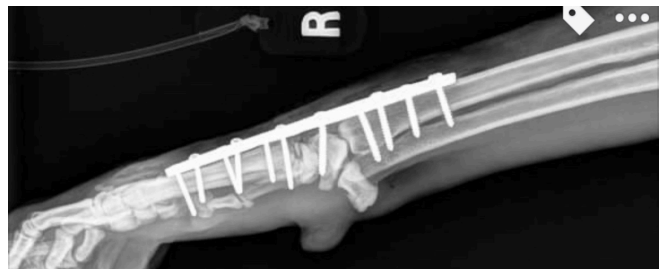
- Please remove this bandage when you arrive home.

Implant removal: If a chronic irritation &/or infection develops &/or pain/swelling, the metal plate & screws can be removed once the the surgical site & associated bones has completely healed.

- Please note that the metal implants are NOT routinely removed following carpal arthrodesis surgery.

Medications:

A pain management protocol has been prescribed which should be very effective. If your pet seems to be uncomfortable (whining, restless), the most common cause for this is that your pet needs to urinate. Take your pet outdoors to eliminate. If your pet still seems painful, please give us a call.



ARTHRODESIS (partial vs pan) POST-OPERATIVE PHYSICAL REHABILITATION

The Effects of Immobilization on the Musculoskeletal System

Firstly, it is important to understand what happens to soft tissues & articular structures after a period of immobilization or disuse. It is well known that muscle atrophy is caused by disuse, such as bed rest or unilateral lower limb immobilization. 20 days of bed rest has been shown to induce up to 10% atrophy in the lower limb muscles. Total hind limb immobilization has shown to reduce 40% loss of muscle mass. The disuse effects to muscles include a loss of lean tissue mass, an atrophy of type I slow-twitch (oxidative) muscle fibers & their associated tendons (generally the extensor muscle groups), & a biochemical conversion of subtype IIa skeletal muscle fibers into type IIb, thus further debilitating the oxidative (aerobic) capacity of the muscles. When muscles are immobilized in a shortened position, this causes a loss of serial sarcomere number along the length of the muscle fibers with a consequent shortening of the muscle length & loss of strength. As well, immobility results in a loss of muscle protein due to an early decrease in protein synthesis rate, which leads to an increase in protein degradation & hence a loss of muscle volume.

Immobilization can also lead to ligament atrophy, with a decrease in maximum load to failure & a decreased biochemical, structural & mechanical properties. Cartilage can also be affected by immobilization: Degenerative joint changes occur & there is a gradual reduction in protein Lycian content & production, a thinning or loss of articular cartilage, a decrease in cartilage matrix & cellular components & a decrease in synovial fluid which then reduces cartilage nutrition. A loss of subchondral bone, osteoporosis, osteopenia, osteophytes & periarticular fibrosis are problems with immobilization that affect bone. Additionally, in situations of non-use, bone exhibits demineralization (specifically, a loss of calcium) & protein wastage due to loss of gravitational forces & movement.

Therapeutic Intervention

As compared to other articular surgical interventions where the rehabilitation targets the affected joint & its most proximal soft tissue structures, physiotherapy for a post-operative arthrodesis primarily targets the adjacent joints & their corresponding soft tissue structures as well as bone demineralization / osteoporosis. Additionally, focus on overall function is of great importance.

Stretching of Soft Tissue Structures

Week 2 (Day 8): Three Times Daily for 10-15 minutes

In the case of carpal arthrodesis, full flexion & extension of the shoulder joint (including the scapulothoracic synsarcosis), the elbow joint & each digit should be administered regularly to stretch the 1-joint muscles surrounding these joints. As well, specific stretching of the 2-joint muscles (biceps brachii, long head of the triceps, the superficial & deep digital flexors, the common digital extensor & the lateral digital extensor) & muscles that are NOT generally put in a lengthened position when a forelimb is immobilized (latissimus Dorsalis, there's major, rhomboids & brachiocephalicus) should be addressed with stretching. Stretching has been shown to be effective in increasing joint & muscle flexibility. Regular stretching can improve eccentric & concentric force production, velocity of contractions, counter-movement jump height & athletic performance. It is recognized as a very powerful stimulant of muscle growth & protein synthesis & has been demonstrated to reduce the amount of muscle fiber atrophy following immobilization or deconditioning. Stretching can achieve these effects in the soft tissues of the joints proximal & distal to the carpus in this scenario following application of an external computation & convalescence.

Joint Mobilizations & Passive Range Of Motion (pROM)

Week 2 (Day 8): Three Times Daily for 10-15 minutes

The health of the adjacent joints should be addressed as soon as possible. Joint mobilizations (passive articular movements &/or accessory movements) have been reported to aid in cartilage nutrition, restore voluntary movement & enhance periarticular soft tissue metabolism. Note that the repetitive passive joint

movements (oscillations) need to be carried out at the limit of the joint's available range to achieve these mechanical effects ie tissues need to be stretched.

Weight Bearing & Therapeutic Exercise

Week 2 (Day 8): Three Times Daily for 10-15 minutes

A study of the effects of weight-bearing on healing of the cortical defects was conducted on the canine tibia. This study found that significantly less woven bone formed in the defects in non-weight bearing tibia than in the weight bearing tibia. This was determined to be due to the disuse response in the under-loaded tibia, in which less bone formed, rather than to the formation of more bone in the weight-bearing tibia. Weight bearing has the potential to result in earlier recovery of mobility & strength & facilitation of an earlier return to activities. The canine patient should be encourage to weight bear on the affected limb & therapeutic exercises that safely encourage partial weight bearing may also be used & progressed. Muscular strengthening of the affected limb will be accomplished in the same manner with many of the same technique. As well, swimming (at >3 weeks once incision skin site has healed) & hill walking may enhance both forelimb strength & range of motion (ROM) - of the shoulder, elbow & possibly digits.



If you have any questions, please feel free to ask your primary veterinarian &/or veterinary surgeon.

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