

## CALCANEUS (HEEL BONE) FRACTURE

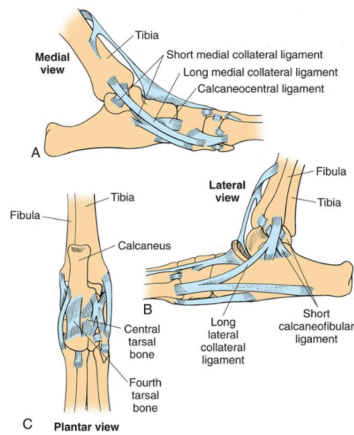


FIG. 34.150 (A) Medial, (B) lateral, and (C) plantar views of ligament structure...



### OVERVIEW

Fractures of the calcaneus bone are debilitating as they affect the function of the common calcanean tendon apparatus. Fractures of the calcaneus are frequently encountered in the racing greyhound & also occur sporadically in non-racing breeds ie companion pets (dogs & cats). Unfortunately, companion pets who sustained these heel bone fracture is due to high impact/force trauma such as getting hit by a vehicle.

4 types of calcaneal fracture are generally recognized: Salter Harris (growth plate) type 1 or 2 fractures involving the proximal calcaneal physis (growth plate), mid-body fractures, slab fractures of the calcaneus & avulsion fractures involving the ligaments from the base of the calcaneus.

Various methods have been recommended for treatment of calcaneal fractures in dogs including external coaptation (splint) - NOT effective / NOT recommended ALONE, pins & tension band wiring, lag screw(s), bone plate(s) & arthrodesis (joint-bone fusion) of the calcaneus-tarsus joint. Which stabilization method is elected depends on the configuration of the fracture & the presence of intertarsal subluxation or concurrent tarsal injuries.

Because calcaneal fractures are distracted by the pull of the gastrocnemius muscle, preventing bone contact between bone fragments & interfering with healing, treatment methods must resist tensile forces. If reconstruction of the complex bone fracture is NOT a viable option then partial arthrodesis may be needed.

## PHYSICAL EXAMS

Calcaneus fractures will cause the patient to walk in a plantigrade (foot footed) on the limb or may be non-weight bearing. Pain, swelling & crepitus are present in the affected limb. Malalignment (varus or valgus) deviation of the foot is usually present.

## DIAGNOSTICS IMAGING

Most pets are in pain & require sedation or general anesthesia for proper positioning to obtain quality radiographs. CT scan may be needed in some complex cases.



*Figure 2 – Stress views can be useful in characterising the full extent of the injury*

## LABORATORY FINDINGS

Traumatized animals undergoing surgery should have sufficient bloodwork done to assess the risk of anesthesia & surgery.

## DIFFERENTIAL DIAGNOSIS

Calcaneal fractures must be differentiated from lacerations or rupture of the Achilles tendon. Acute lacerations have an open wound & soft tissue swelling is limited to an area proximal to the calcaneal tuberosity. Fractures of the calcaneus exhibit swelling caudal to the tarsus & crepitation (crunchy bone) may elicited on palpation.

## MEDICAL MANAGEMENT

Medical or conservative management is NOT indicated. Anatomic reduction & rigid fixation are necessary for optimal outcome in pets. Conservative treatment with casts or splints is NOT effective. External coaptation (splint) alone is also NOT appropriate for calcaneal fractures because bandaging &/or splint application is ineffective in countering tensile forces by produced by the Achilles muscle-tendon unit.

## SURGERY MANAGEMENT

Surgery consists of surgical implants (screws, pins &/or tension wire) & application of a specifically designed bone plate. In most cases, a splint & a soft cast padding bandage may be necessary for 4-6 weeks to supplement support. The splint & bandage changes are typically change initially after the surgery within 1-3 days then 3-5 days then every 5-7 days dependent on the condition of the splint/bandage, how the patient is recovering & how the patient's clinical outcome has been progressing. This is dependent on plate selection, type of injury, severity of injury & surgical technique. There is no exact time frame or formulation for splint/bandage changes. If you notice anything that appears to be abnormal, you must go have your pet seen by your primary veterinarian &/or veterinary surgeon.

Suture removal is recommended at 2 weeks after the surgery. Exercise is limited to short leash walks only for a minimum of 6-8 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. Follow up radiographs at ~6-8 weeks.

Usually, after the bone heel has healed there are usually good level of function & good use of the limb during the phase of walking (ambulatory).

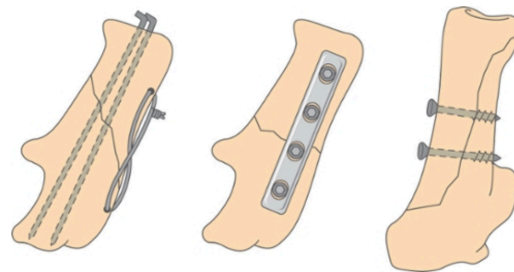


FIG. 33.62  Transverse calcaneal fractures can be stabilized with a tension band wire c





## **COMPLICATIONS**

After calcaneus fracture surgery complications may include, but are NOT limited to swelling after surgery, pressure sores from the bandage/splint, infection, non-union (fracture bone not healing), implant breakage/loosening &/or implant related lameness. Calcaneus fracture does have a low 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.

# **CALCANEUS (HEEL BONE) FRACTURE**

## *Discharge Information*

Discharge Instructions – Calcaneus Fracture

Surgery: Calcaneus Fracture

Prognosis: Fair to 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 pet stops or regresses about using the operated limb. Please note that your pet's gait on the operated limb will NOT be perfectly normal, but pain from the fracture injury will be relieved after the bone has healed together.

### **Diet**

If your pet will NOT eat the regular diet, a homemade bland diet (50:50) mix of lean hamburger, chicken breast, lean turkey meat, cottage cheese &/or a carbohydrate source such as rice, potato, or pasta should be offered for 1-3 days & then wean back onto the regular diet over the next 3 days.

### **Bowel Movements**

Your pet may NOT have a bowel movement for the next 3 days after surgery & 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 by your primary vet.

### **Exercise**

1. Cover all slippery floors with throw rugs or indoor/outdoor turf carpet for the first 6-8 weeks after surgery.
2. Limit activity to very short leash walks for bowel & urinary purposes until the bone is healed (typically 6-8 weeks). Do NOT leave your pet off the leash for 3 months or as recommended by the surgeon. No jumping, jogging, furniture, 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, which will result in delay bone healing, additional vet visits +/- surgery &/or additional cost.

### **SPLINT with inner padding bandage (Robert Jones)**

1. The splint will support the limb during the healing process. We estimate that the limb will need to be supported for a total of 4-6 weeks; duration of splinting will be determined by your veterinarian/veterinary 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 splint & make sure that the toes are warm.
  - A pet chewing or licking at the splint may indicate that there are pressure sores.
  - A foul odor from the bandage may indicate an infection.
  - Blood or discharge staining through the splint may indicate a pressure sore or infection - Sudden worsening lameness of the splinted limb.

Please call us if any of these problems are noted.

Incision: After the splint 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 splint will need to be changed at least every few days to weekly; the splint is likely a clam shell & this part will be reused during the entire period of splint unless it gets worn. If sores develop on the splinted paw/leg, splint changes will need to be done more frequently (as determined by your veterinarian).
  - Please make an appointment for the next splint change with your primary care vet.
2. Radiographs (x-ray) of the operated limb should be done in 6-8 weeks to check the healing process at primary care vet.
  - Please schedule your appointments ahead of time, as our schedule fills quickly
  - IV catheter bandage: Your pet had an IV 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.
  - The bandage over where the IV catheter should NOT stay on overnight.

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.

- The metal implants are NOT routinely removed following fracture repair surgery.

**MEDICATION(s)**

A pain management protocol has been prescribed which should be 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 your primary vet to consult & add or change medications recommendations.

## **CALCANEUS (HEEL) FRACTURE**

### *POST-OPERATIVE PHYSICAL REHABILITATION*

#### **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 calcaneus fracture primarily targets the adjacent joints & their corresponding soft tissue structures as well as bone demineralization / osteoporosis. Additionally, focus on overall form & function is of great importance & should NOT be ignore or neglected.

#### **Stretching of Soft Tissue Structures & Adjacent Joints**

*Week 2 (Day 8): 2-3 Times Daily for 10-15 minutes*

In the case of calcaneus fracture repair, full flexion & extension of the foot (digit) joint, stifle (knee) joint & hip joint should be administered regularly to stretch surrounding these joints. When there is splint/bandage change, please ask your primary veterinary staff to perform passive range of motion to the tarsus (ankle) joint which is above the calcaneus (heel bone) fracture repair since you are unable to perform this due to the splint/bandage inhibiting this activity.

As well, specific stretching of the 2-joint muscles of the shin bone muscles & the thigh muscles with its associated flexor & extensor tendons. These muscles & tendons are NOT generally put in a lengthened position when a rear limb is immobilized should be addressed with stretching. Stretching has been shown to be effective in increasing joint & muscle flexibility. Regular stretching can improve & build stronger muscles (muscle strengthening), force & velocity of muscle contractions, counter-movement jump height & athletic performance (if applicable). It is recognized as a powerful stimulant of muscle growth & protein synthesis & has been demonstrated to reduce the amount of muscle fiber atrophy following immobilization. Stretching can achieve these effects in the soft tissues of the adjacent joints near the surgical area.

#### **Joint Mobilizations & Passive Range Of Motion (pROM)**

*Week 2 (Day 8): 2-3 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. Perform pROM as much as your pet can tolerate under concurrent use of anti-inflammatory, pain medications &/or sedation. Be gentle & be patience & do NOT force this activity, but more to guide & encourage your pet to do so.



## **Weight Bearing & Therapeutic Exercise**

*Week 2 (Day 8): 2-3 Times Daily for 10-15 minutes*

Many studies has supported that if a leg is NOT being exercise/use after surgical repair due to confinement then the bone density will be reduced. So if you don't use it, you will lose it. Pets who get regular physical rehab exercise regimen will encourage the fracture bone & adjacent bones to put down more bone formation & also better & faster fracture bone healing.

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 (minimal incline & decline) walking may enhance both forelimb strength (if applicable) & range of motion (ROM) - of the digits, knee joint & hip joint.

If you would like assistance with your pet's exercise recovery, please let your veterinary team know so we can provide a referral to a local veterinary physical rehabilitation center. If you have any questions, please feel free to ask your primary veterinarian &/or veterinary surgeon.

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