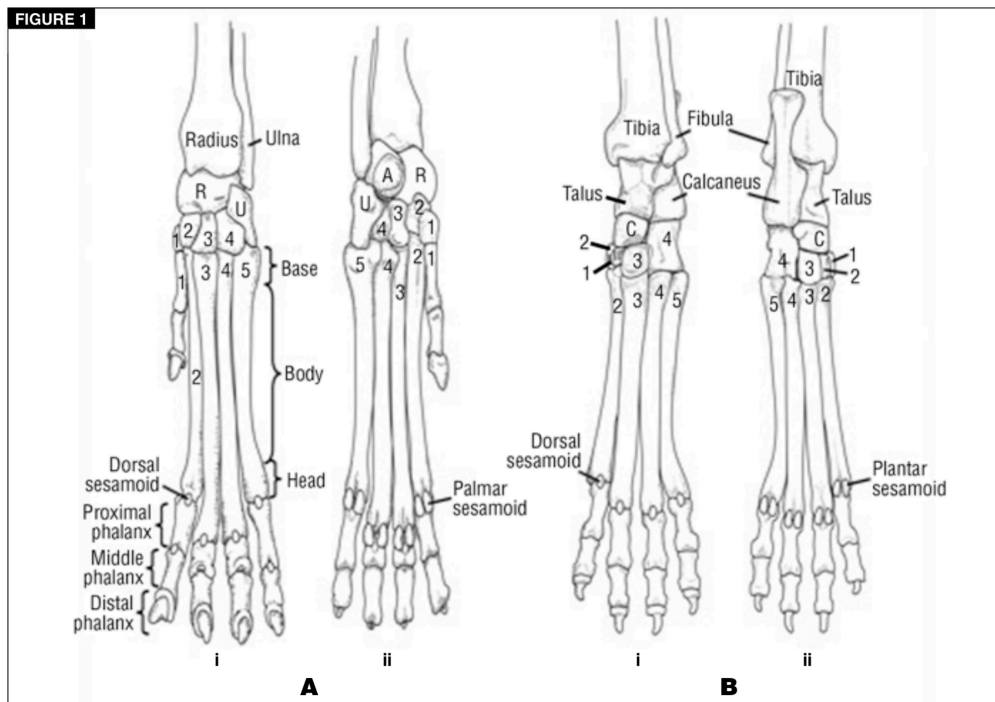


FOOT BONE(S) FRACTURE (MetaCARPAL - front foot vs MetaTARSAL - rear foot)



WHAT ARE THE METACARPAL/METATARSAL BONES?

The metacarpal/metatarsal bones are the bones on the forelimb/rearlimb of the dog that connect the “wrist” (carpus)/“ankle” (tarsus) to the toes (the phalanges). There are 5 metacarpal bones on each limb, with the major weight bearing bones being the central metacarpal bones 3 & 4.



Anatomy of the forepaw and hindpaw. (A) Dorsal (i) and palmar (ii) aspects of the forepaw. (B) Dorsal (i) and plantar (ii) aspects of the hindpaw. A = accessory carpal bone, C = central tarsal bone, R = radial carpal bone, U = ulnar carpal bone.

Images courtesy of Mal Hoover, Kansas State University

WHAT IS A BONE FRACTURE?

A fracture of the bone is when the normal architecture of the bone is disrupted. This can occur due to a variety of reasons (trauma, disease, etc) & as such can present in a number of ways. Most commonly there will be complete fractures where a clean break is present or comminuted fractures where there are multiple fragments of bone present.

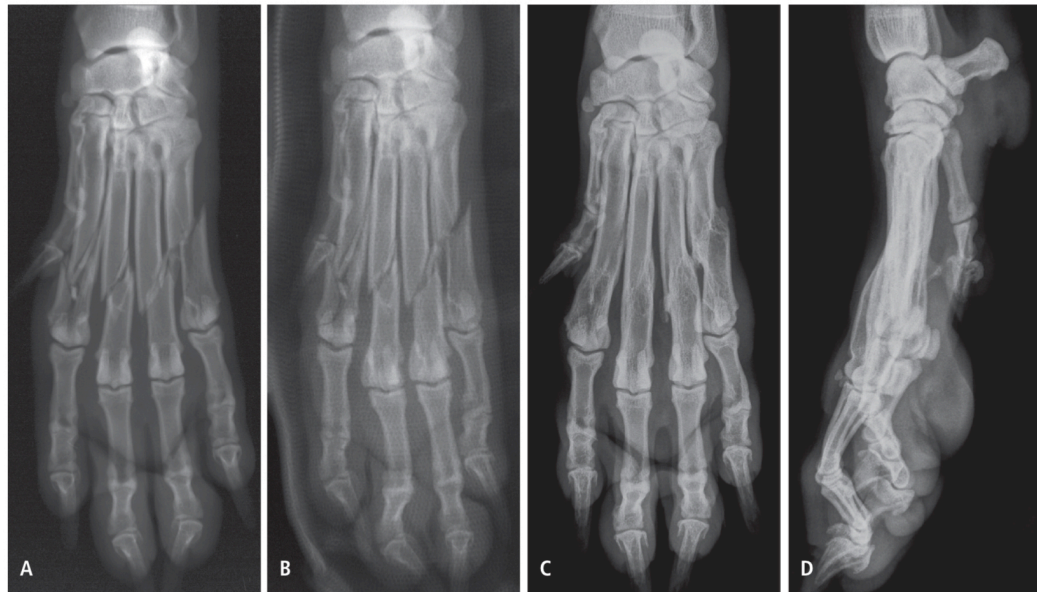
CLINICAL SIGNS OF METACARPAL/METATARSAL FRACTURES

The most common signs that accompany a metacarpal fracture are sudden onset non-weight bearing in one of the limbs, often accompanied by a painful swelling in the distal limb around the fracture toe/digit.

DIAGNOSIS OF METACARPAL FRACTURES

In order for the veterinary surgeon to get a definitive diagnosis & formulate a proper treatment plan, x rays under sedation will often be necessary to see the extent of the fractures.

Figure 1
Dorso-palmar and medio-lateral radiographic views in a four-year-old German Shepherd dog from Group 1 (dog 34) taken before (A), immediately after (B), and approximately 10 years after (C, D) external coaptation of diaphyseal fractures of the second to fifth metacarpal bones. The dog was not lame.



TREATMENT OPTIONS OF METACARPAL FRACTURES

There are multiple treatment options available for the treatment of fractures of the metacarpal/metatarsal bones. Management of fractures can be non-surgical or surgical.

NON-SURGICAL

Non-surgical treatment can be used when:

- There is a fracture of a single metacarpal bone
- When there is little displacement of the fractures (even of multiple bones)

Non-surgical treatment is often via splinting or cage rest alone with no dressing. With splinting/dressing the limb, complications are not uncommon & relate to soft tissue injury when the dressing slips. This can be severe if the blood supply is cut off to the foot. Dressings require diligent monitoring at home.

SURGICAL

Surgical treatment should be considered in the following:

- When there is significant malalignment of the bones
- When more than two metacarpal/metatarsal bones are involved
- When there are open fractures.

Several techniques for surgical treatment are available. These include:

■ INTERNAL FIXATION - Plates & Screws

- These can be used for both simple & comminuted fractures
- As these bones are small this will only be an appropriate method of treatment if the metacarpal/metatarsal bones are of sufficient size to accept the implants.

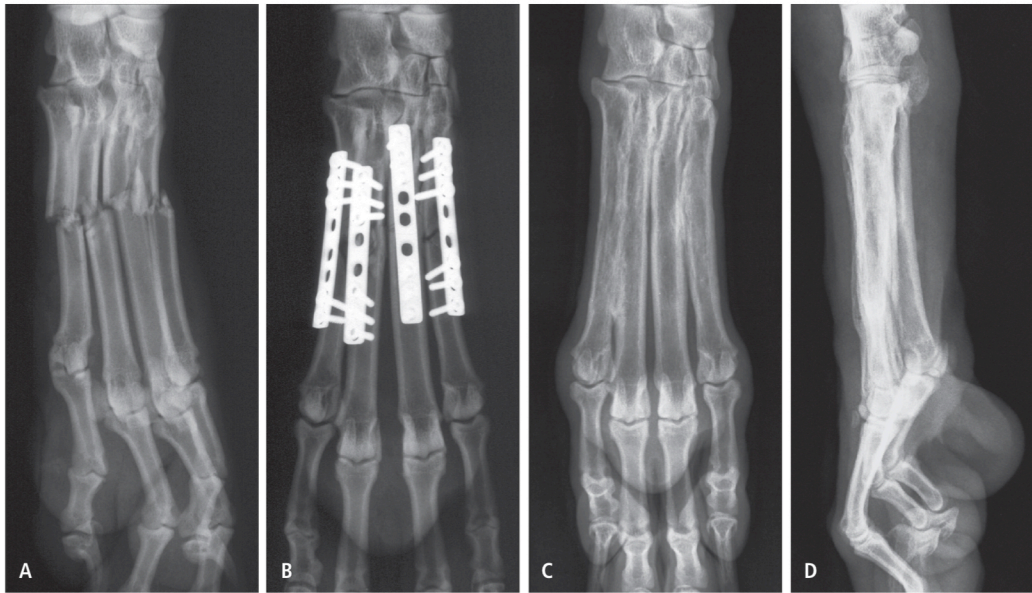


Figure 2
Dorso-plantar radiographic views in a two-year-old German Shepherd dog from Group 2 (dog 24) with fractures of the second to fifth metatarsal bones preoperatively (A) and one year after treatment with standard bone plates (B). The dorso-plantar and medio-lateral radiographic views taken nine years after treatment (C, D) revealed synostosis between the second and third metatarsal bones. The dog was not lame.

■ INTRAMEDULLARY (IM) PIN

- This is when a pin is placed down the center of the fractured bones in order to improve alignment.

Figure 3
Dorso-plantar views in a two-year-old German Shepherd dog of Group 3 (dog 8) with fractures of the second to fifth metatarsal bones and a lateral wound preoperatively (A) and postoperatively (B) after dowel pinning of the second to fourth metatarsal bones. The fifth metatarsal was immobilized by external coaptation. The dorso-plantar and medio-lateral views taken eight months later (C, D) show synostosis between the second to fifth metatarsal bones and malunion of the fifth metatarsal. The dog was not lame.



■ EXTERNAL SKELETAL FIXATOR (ESF)



Postoperative image illustrating the use of an epoxy external skeletal fixation system for the fixation of metacarpal shaft fractures in a dog.

- This is when pins are placed into the bone, through the skin & held in place by an outer connecting bar

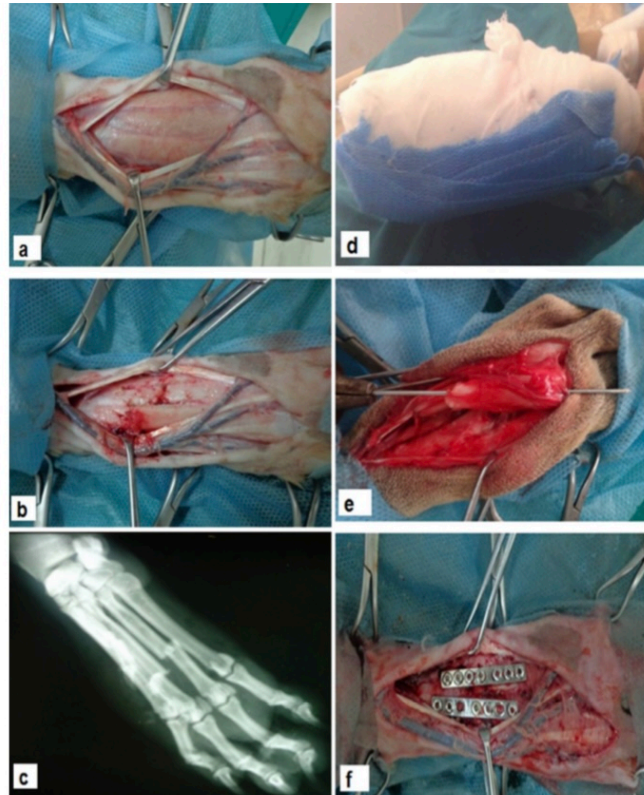


Figure 1: Showing the surgical steps of the fractured III and IV metacarpals and methods of fixations
a: showing extensor tendons were retracted laterally and medially exposing metacarpal bones; **b:** showing the fractured III and IV metacarpal bones at different levels; **c:** showing a representative x-ray film of the fractured III and IV metacarpals; **d:** showing application of fiberglass on the palmar aspect of the distal limb; **e:** showing application of K-wire (intramedullary pin) retrograde technique; **f:** showing application of bone plates (2mm).

POST-OPERATIVE MANAGEMENT

Animals that undergo surgery to treat fractured metacarpals/metatarsals will need to be rested for as much as possible initially. Regular check-ups with the surgeon will be needed in order to assess how healing is going. X-rays may be needed in order to evaluate healing fracture & ESF frames can be removed once adequate healing has occurred.

FOOT BONE(S) FRACTURE

Patient Discharge Information

Your pet has had fractures of the foot bones repaired with surgical grade implants called bone plates/screws &/or pins. These implants are surgically attached to the bone, bridging the fracture in that bone to provide stability until the bone heals to its original strength. A splint is usually necessary for foot fracture repair during recovery until the bones heal; the teal implants are NOT big enough nor strong enough to withstand the large forces acting on the foot during walking. Most commonly, 2 of the 4, foot bones will be supported internally with plate/screws &/or pins. Most patients do NOT have long term activity restrictions & the majority of patient will have their implants for their whole life

GENERAL INFORMATION

Please keep a note of your questions as you & your pet progress thru recovery & address them to your primary care veterinary team. Our surgery group will contact your primary care team on DAY 2 & DAY 14 to check in on your pet's progress & see if you have had any concerns or questions. This method will maintain continuity in care & an accurate patient medical record. Feel free to contact me directly if you cannot get a hold of your primary care veterinary team in case of urgent help is needed.

FIRST FEW DAYS POST-OP

Please keep your pet in a comfortable, safe, indoor location w/o free access to stairs for the next 24 hours as he/she recovers from anesthesia & surgery.

Your pet may be groggy for the next few days. He or she may whine or appear more anxious than usual; this may indicate pain/discomfort or side-effects of the medications. Please call your primary care veterinary team for assistance with medication adjustments or return for exam & additional pain medications as needed.

Monitor your pet's appetite & attitude. If both do NOT steadily improve over the next 2-3 days, please call your primary vet or return for progress evaluation & problem-solving.

You can expect your pet to have a bowel movement within 4 days. Some animals take longer than others depending on when they last ate prior to surgery & when they started eating after surgery. It may be abnormal in color & consistency for 2-3 days.

Please confirm that your pet has urinated w/in 24hrs of returning home. If he or she does NOT or you have notice any problems related to urination, please report this to your primary vet.

MEDICATIONS

It is likely that your pet has been prescribed one or more medications (given by mouth - PO) over the first 2 weeks of recovery. During the discharge appointment or shortly thereafter, please make sure you understand the following:

- What each medication is being used to treat,
- What side effects may develop &
- Whether or NOT the medications should be refilled & continued.

BANDAGE CARE

A padded bandage with rigid splint has been applied to the operated leg/surgical site. The goal of this bandage is to provide pressure to the surgical site to minimize swelling, improve patient comfort & provide some additional support to the surgical repair.

It is recommended the limb be supported with a rigid splint - bandage for minimal of 4 weeks. The first initial bandage examination & change should be within 1-3 days then every 3-5 days then every ~7days. Splint & bandage changes timing can varies depending on multiple factors ie soil, dirty, swollen digit/foot, hemorrhage “strike through,” smell/odor & pain. Thus, adjustments to this interval will happen throughout the recovery period.

It is very important you monitor the bandage carefully; if there are any concerns you should talk to your primary vet immediately.

Check for swelling of the toes/digits (ie toe nails spreading apart), excess wound discharge (fluids seeping through the bandage), rub sores (at the top or bottom edges), or foul odors.

The splint/bandage should be comfortable; a pet chewing at the bandage may indicate a serious problem. Please visit your primary vet immediately if the bandage appears uncomfortable for your pet.

Keep the splint/bandage clean & dry. Apply a plastic bag or protective boot over the bandage/splint when your pet goes outside; remove when indoors. If the bandage becomes wet or soiled, it will need to be changed immediately - do NOT wait; please visit your primary vet for help.

We strongly advised that you do NOT modify the bandage in any way. Adding tape or other wrappings can seriously compromise the safety of the splint/bandage. If you are concerns about the security or integrity of the bandage, please return for re-evaluation & reapplication as needed.

****Please know that splints & bandages can cause very serious complications. They are very effective treatment tools for better healing & pain control, but careful monitoring & appropriate follow-up must occur. If you have any questions or concerns related to issues outlined above or in general regarding splint/bandages wear, please do NOT hesitate to call your primary vet.**

RESTRICTIONS

It is very important to restrict activity until healing is seen on x-rays usually 4-8 weeks dependent on your pet's age ie puppy vs adult vs senior. Absolutely no jogging, running, jumping or playing of any kind is allowed.

Confine your pet to one level/section of the house on carpeted floors or crate confine only if your pet does NOT anxiety/self-destructive behavior in a kennel. Use baby gates, etc. to prevent access to slick floors or stairs. Do NOT allow jumping on & off furniture. Rugs can be used to reduce the risk of slipping on slippery surfaces. Confine to a small area/room/crate when unattended.

If it is necessary to navigate some stairs, they should be kept to a minimum. Use caution & direct supervision (up & down) with a hand on the collar &/or chest harness & a safety strap/leash under the belly to prevent falls.

Please always use a short (6ft) leash when taking your pet outside to urinate/defecate during this restriction period.

WEEK 1 & 2 - POST-OP

Your pet should start touching his/her toe down w/in the 1st 2 weeks. Thereafter, leg use should steadily improve. If your pet is NOT using the limb by 2 weeks, if you notice a sudden deterioration or if your pet stops using the leg at any time after the surgery please call your primary vet immediately for guidance. While it is NOT unusual for brief episodes of discomfort over 2-3 months of healing, limping that continues for more than 24 hours should be examined. X-rays or other tests may be needed to diagnose significant problems.

Your pet will feel like using the leg normally before the bone is well healed. Please continue the restriction during this difficult time when he/she is feeling "too" well! Failure to do so can result in serious healing problems.

If your pet's personality-type challenges these restrictions, discuss options for medicinal-assistance for your pet to make restrictions easier to manage (ie acepromazine, gabapentin &/or trazadone).

BANDAGE CHANGE/PROGRESSIVE EXAMS

It is important that regular bandage changes be performed to monitor for complications that can develop under a bandage. The foot sweats normally & will create a damp/warm environment under the bandage. "Athlete's Foot" - type skin irritation (dermatitis) is common & somewhat tolerated & managed until the bandage can be removed.

MONTH 1 & 2 - POST-OP

Activity restrictions continue to be important. Bandages become more difficult to manage complications occur more frequently & bone healing is delayed when activity restriction are NOT enforced.

Some patients will have a less rigid, soft padded bandage applied after the rigid splint is removed. This allows for a gradual return of stress to the injured area.

After the splint/bandage removal, many pets are sore & limp more for a few days. If this setback lasts longer than a few days, please contact your primary vet.

X-rays are recommended at 6-8 weeks after surgery to evaluate bone healing. Depending on the stage of healing, additional x-rays may be recommended to monitor the recovery.

A slow return to activity, on leash, can begin after the x-rays & exam confirm an appropriate stage of healing.

LONG-TERM LIFESTYLE

There are no long-term restrictions for your pet, after the fracture is healed.

Once a fracture is well healed, there is minimal risk to that site in the future. The metal implants do NOT create problems in the majority of patients. Occasionally these metal implants will become infected, loosen or create bone pain from extreme cold temperatures. Even months to years after the original surgery, if the metal implants cause the patient problems, they may need to be removed.

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.

TREAT Veterinary Surgery Service

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