

## Partial tarsal arthrodesis in the dog

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### Indications

- 1 Plantar ligament rupture (traumatic and degenerative) (Figure 1A)
- 2 End-stage tarsal arthritis (osteoarthritis, infective arthritis or erosive immune-mediated arthritis)
- 3 Unreconstructable or malunion of tarsal fractures (Figure 1B)



1A



1B

**Figure 1: Indications for partial tarsal arthrodesis. A, plantar ligament rupture in a Sheltie; B, Malunion of a central tarsal bone fracture with chronic pain.**

### Patient preparation

The limb is clipped from just below the stifle joint to the level of the main tarsal pad (Figure 1). An impervious barrier is taped in position over the toes. The patient is positioned in dorsal or lateral recumbency depending on surgeon preference. Bilateral surgeries under the same anaesthetic are possible if required. The limb is free-draped and a sterile impervious drape wrapped over the foot. Sterilised cohesive dressing can then be tightly wrapped around the foot and progressed proximally to act as an Esmarch bandage; at the level of the distal tibia, the dressing can be twisted in to a rope and used as a tourniquet.

### Surgical approach

**Option 1: plate and screw fixation:** A medial or lateral incision is made through the cohesive dressing, depending on the indication. A lateral approach allows the plate to extend along the calcaneus and is preferred for calcaneoquartal and tarsometatarsal (TMT) arthrodesis. A medial approach may be chosen for injuries on the medial aspect because the plate can buttress the medial side if there is loss of bone integrity. Once through the skin, the subcuticular tissues can then be stapled or sutured to the cohesive dressing on each side of the incision to isolate the wound.



**Figure 2: Veterinary Tissue Bank DBM is rehydrated in a Galli pot prior to packing in to the joint spaces for osteoinduction**

Fascia is incised to expose the joint capsules. On the lateral side, the joint capsules of the proximal intertarsal joint (PITJ) and TMT joint are incised and the cartilage is removed using a combination of sharp dissection and curettage with manual or powered instruments. On the medial side, the PITJ, DITJ and TMTJ are all debrided as above.

Veterinary Tissue Bank freeze-dried canine demineralized bone matrix (DBM) (+/- cancellous chips allograft if needed) is packed into the joint spaces (see below). A suitable plate is placed in position and secured with suitable screws in neutral positions (compression can cause some anatomical distortion with this eccentrically placed plate).

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In the metatarsals, the screws should be sequentially shorter as they are placed in the distal screw holes such that they do not cross all metatarsals (see Figure 3).

**Option 2: lag screw fixation:** In small dogs, one may consider lag screw (2.7mm or 3.5mm screw) fixation for calcaneoquartal arthrodesis in combination with TMT arthrodesis. The calcaneoquartal joint (C4J) is fully opened and the glide hole is drilled from distal to proximal in the calcaneus. The C4J is reduced and an insert sleeve is placed at the proximal end in the calcaneus. The thread hole is drilled in to the fourth tarsal bone and lateral metatarsals. Veterinary Tissue Bank freeze-dried canine demineralized bone matrix (DBM) (+/- cancellous chips allograft if needed) is packed in to the joint spaces (see below). The lag screw is placed and tightened and routine closure performed.

## Bone graft preparation

For osteoinduction, a suitable volume of (Hoffer and others 2008) (0.1-1mm) is chosen and rehydrated with sterile Hartmann's solution in a Galli pot. Graft volume is approximately 1cc for small dogs and 3cc for medium-sized dogs. If one wishes to extend this DBM (e.g. loss of bone stock), it may be mixed with a suitable volume of Veterinary Tissue Bank's canine allograft cancellous chips.



**Figure 3: A, Post-operative radiograph of a partial tarsal arthrodesis performed using a medial plate and Veterinary Tissue Bank DBM. B, the same joint at 8 weeks fused in the expected timeframe. C, partial tarsal arthrodesis in a Sheltie with lag screw fixation and Veterinary Tissue Bank DBM.**

## References

Hoffer, M. J., Griffon, D. J., Schaeffer, D. J., Johnson, A. L. & Thomas, M. W. (2008) Clinical applications of demineralized bone matrix: A retrospective and case-matched study of seventy-five dogs. *Veterinary Surgery* 37, 639-647.

