

Calcaneal Tendon Injuries in Dogs

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Calcanean Tendon Anatomy

- Common calcanean tendon
 - Achilles tendon
- 5 components
 - Gastrocnemius (paired)
 - Superficial digital flexor
 - Common tendon
 - Biceps femoris
 - Semitendinosus
 - Gracilis



Calcanean Tendon Injury

- Complete tendon disruption
 - Traumatic injury
 - Sharp or blunt trauma
 - Tendon transection
 - Skin may not be lacerated



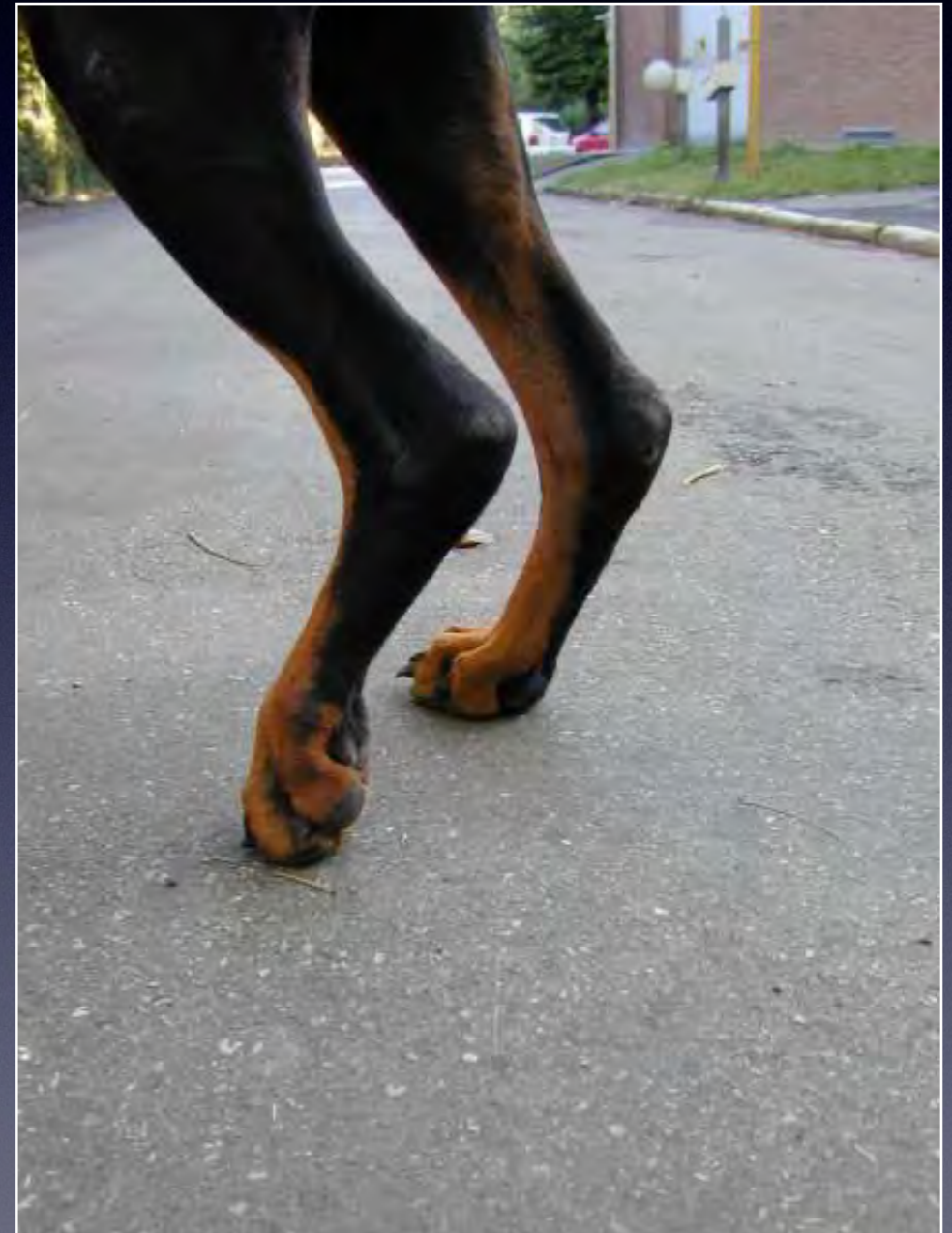
Tendon Injury

- Partial tendon disruption
 - Component damage
 - Partial or complete
- Examples
 - Low grade strain
 - Gastrocnemius avulsion
 - Superficial digital flexor laceration



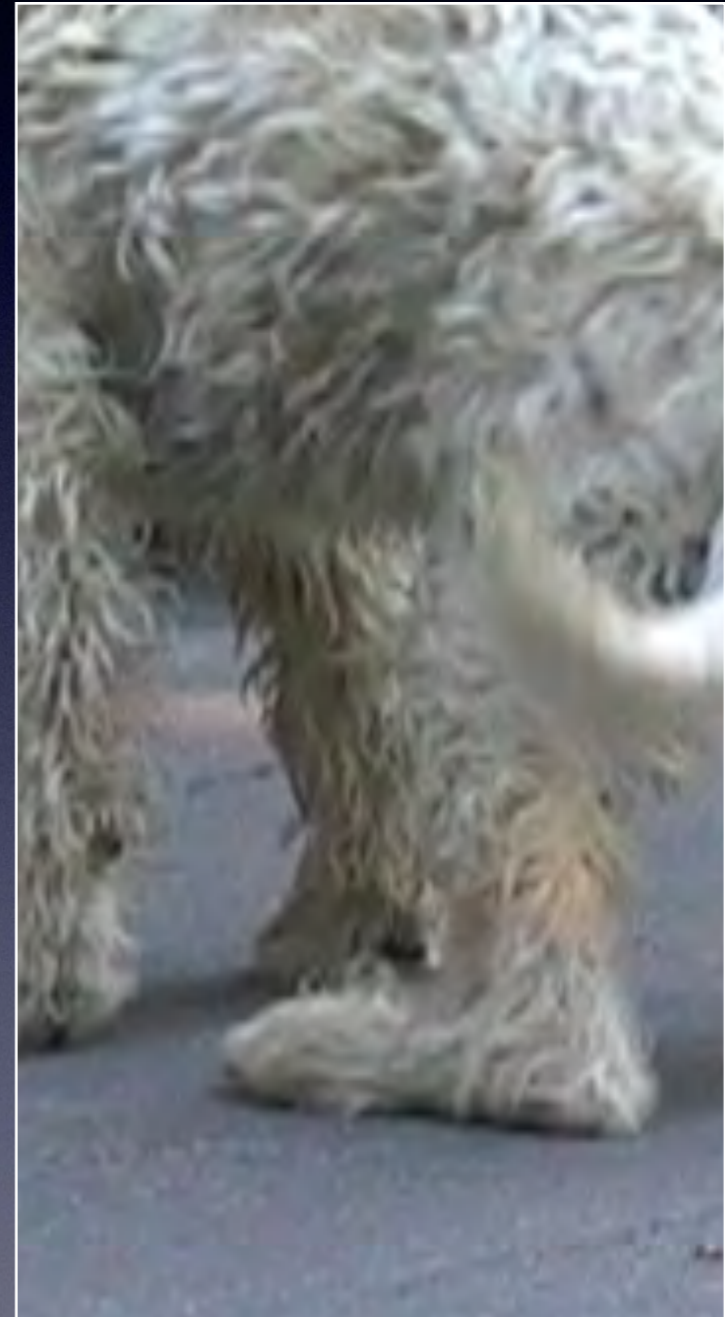
Signalment

- Complete disruption
 - Dogs & cats affected
 - No particular breed or sex predilection
- Partial disruption
 - Gastrocnemius avulsion
 - Labradors & Dobermans
 - Medium or large, active dogs
 - Older female cats



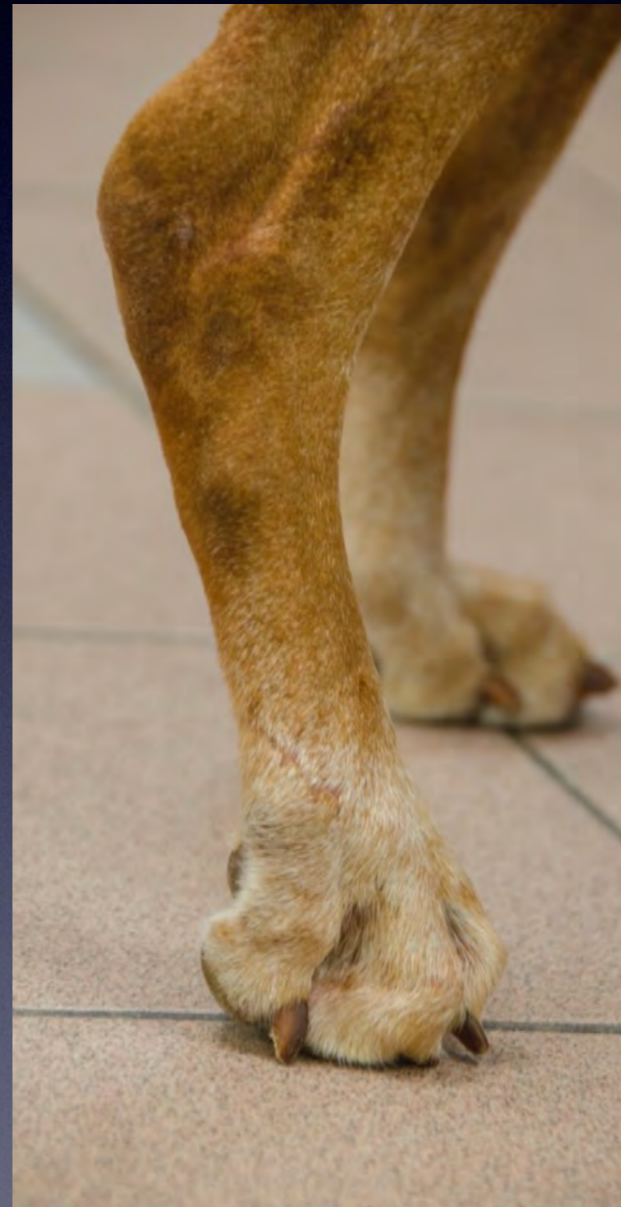
Physical Exam Findings

- Complete tendon disruption
 - Non-weight bearing lame
 - Plantigrade stance
 - May not display pain
 - Skin wound
 - Tendon defect typically palpable
 - Typically midbody
 - Acute vs. chronic

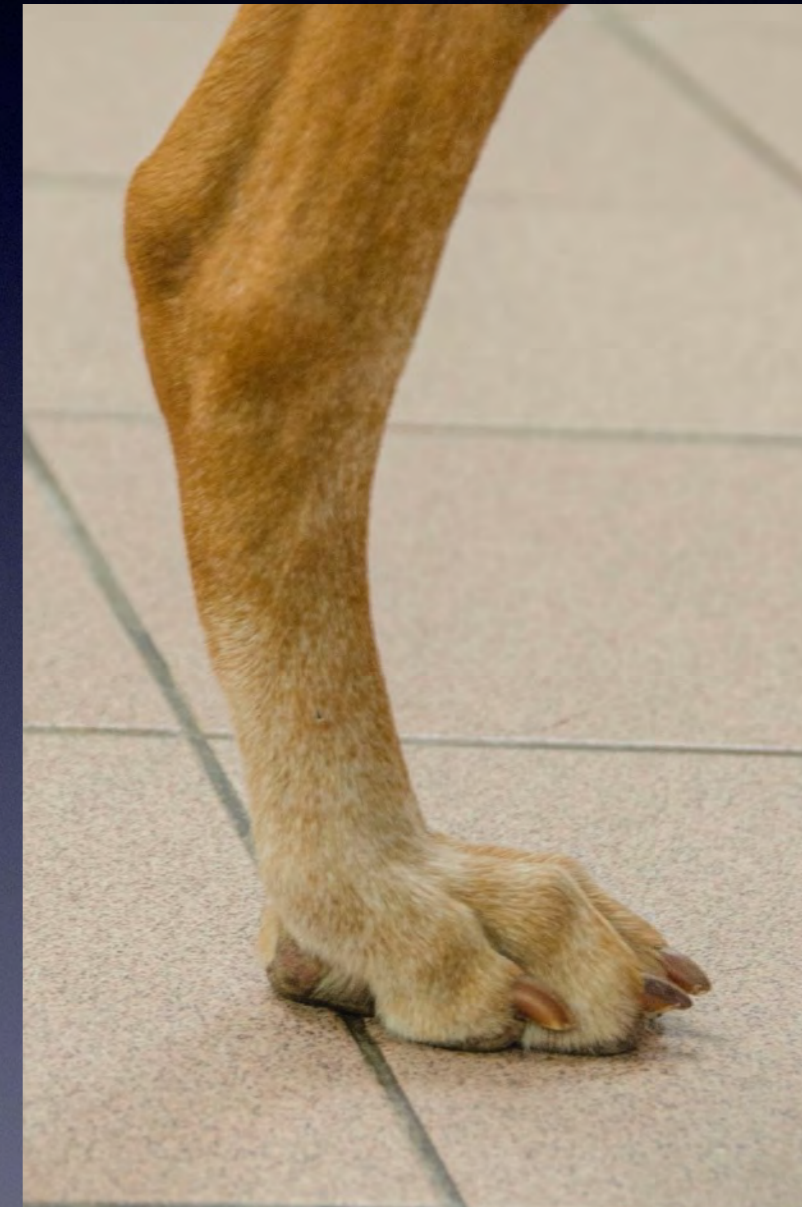


Physical Exam Findings

- Partial tendon disruption
 - Tendon swelling
 - Insertion avulsion
- Hyperflexion talocrural joint
 - SDF intact
 - Hyperflexion of digits
 - “Eagle claw”



Affected



Contralateral

Coaptation or Orthotic

- Immobilization of the tarsus
 - Goal of decreasing stress on calcanean tendon
 - Level of coaptation
- Primary treatment of low grade strain
- Support primary repair



Surgical Treatment Options

- Primary tendon repair
- Fascial graft
- Synthetic mesh
- Tendon transposition
- Tendon allografts
- Synthetic tendon substitutes



Acute Tendon Transection

- Primary surgical repair
 - Suture tendon back together
 - Suture tendon to bone
 - Bone tunnels in calcanean tuberosity
- Tendon end apposition
 - Gelberman et al *JBJS Am* 1999
 - > 3 mm gap affects healed strength

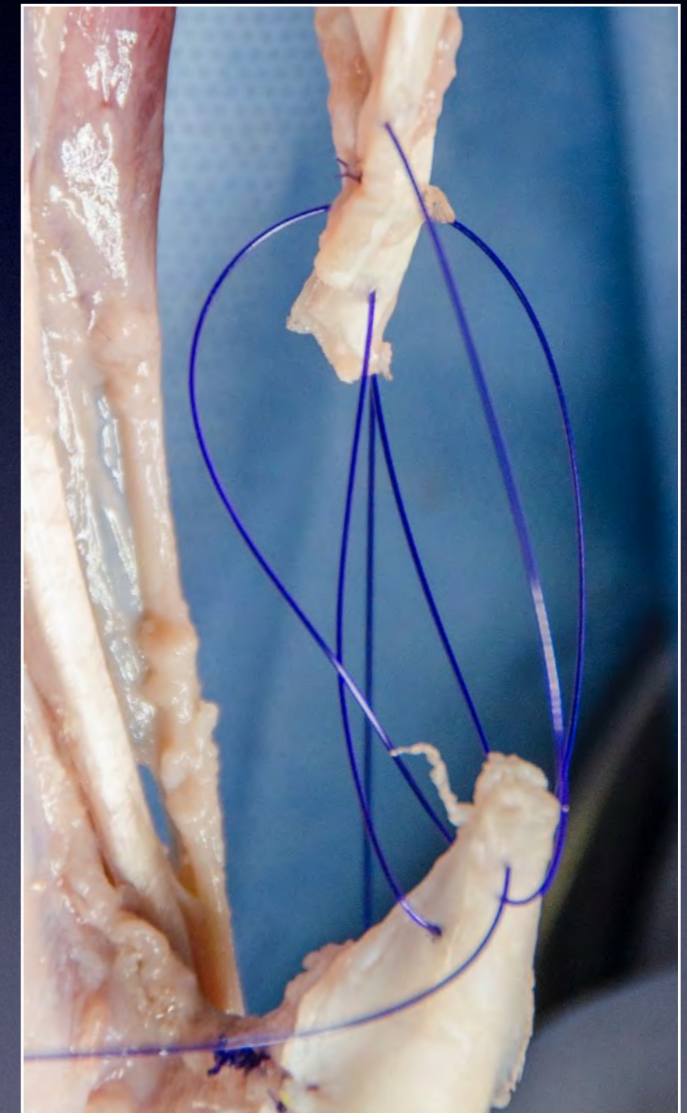


Suture Pattern

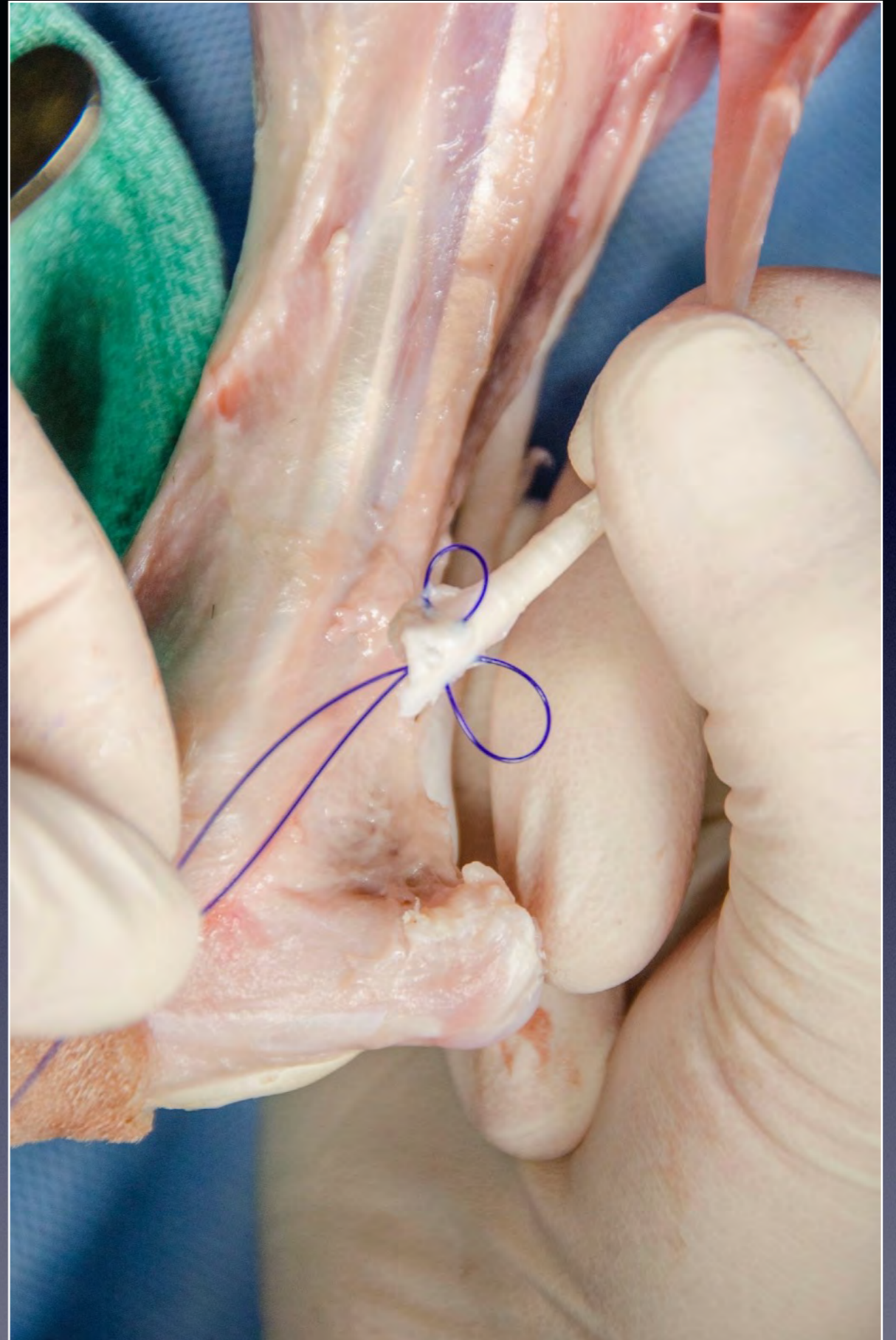
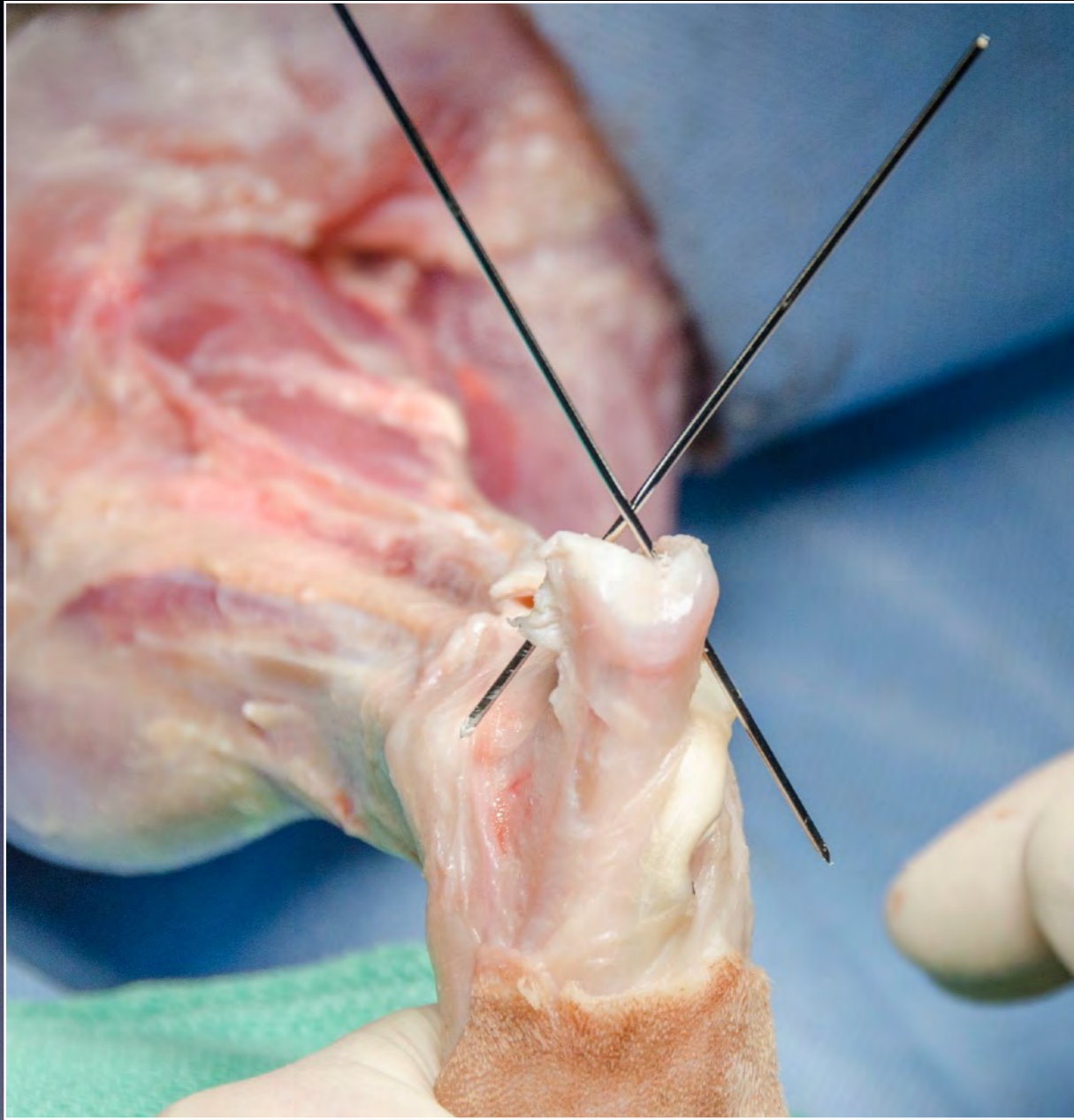
- Tendon suturing techniques
 - Clamp tendon fibers
- Suture pattern
 - Moores et al *Vet Surg* 2004
 - 3 loop pulley vs 2, locking loops
 - 3 loop pulley superior
 - Higher load at 1 & 3 mm gap

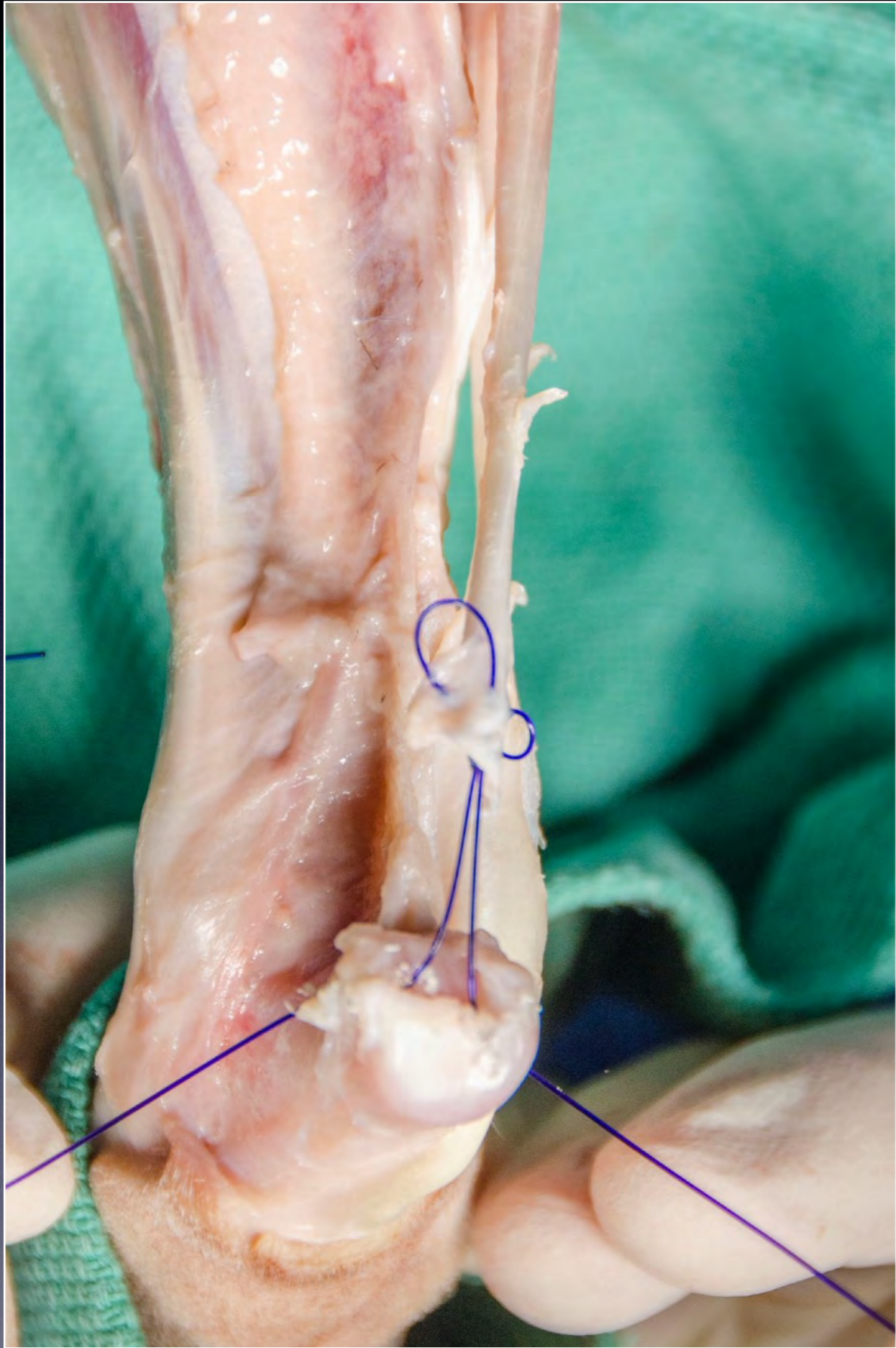


Locking
Loop

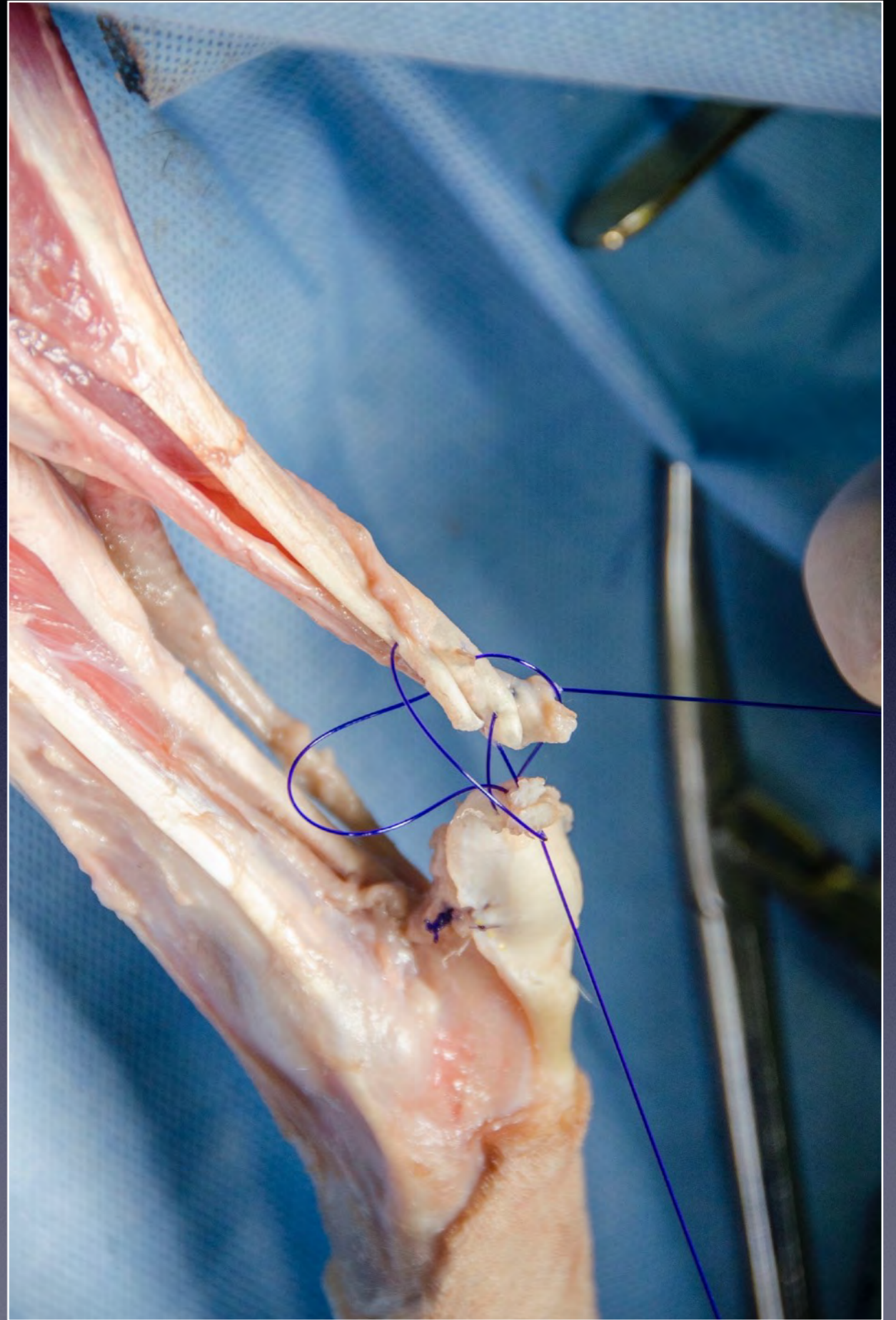
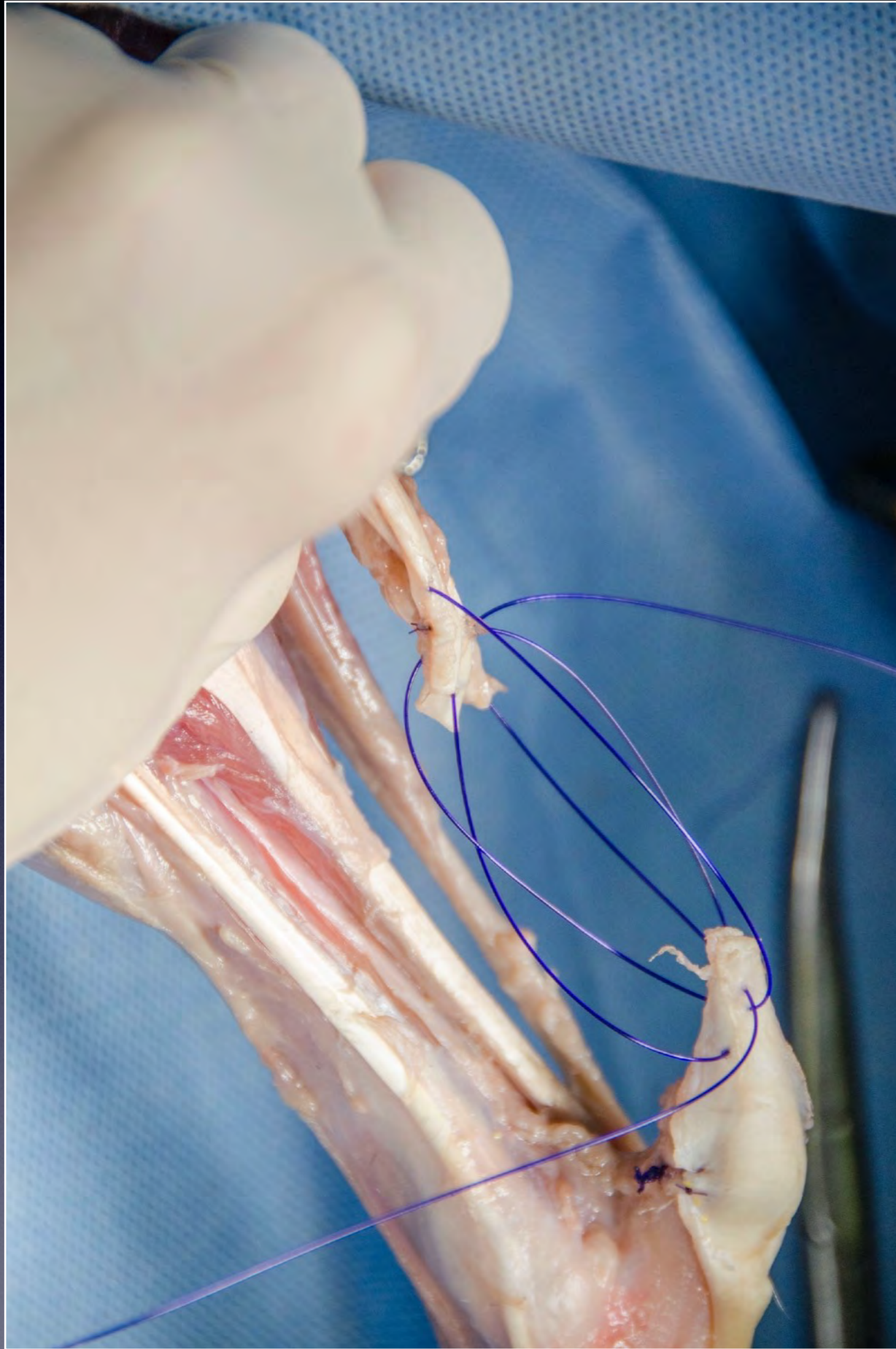


3 Loop
Pulley











Adjunctive Treatments

- PRP
- Stem Cells
- Biologic graft
- Laser/Shock wave

Gastrocnemius Tendon Strain in a Dog Treated With Autologous Mesenchymal Stem Cells and a Custom Orthosis

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Objective: To report clinical findings and outcome in a dog with gastrocnemius tendon strain treated with autologous mesenchymal stem cells and a custom orthosis.

Study Design: Clinical report.

Animal: A 4-year-old spayed female Border Collie.

Methods: Bone-marrow derived, autologous mesenchymal stem cells were transplanted into the tendon core lesion. A custom, progressive, dynamic orthosis was fit to the tarsus. Serial orthopedic examinations and ultrasonography as well as long-term force-plate gait analysis were utilized for follow up.

Results: Lameness subjectively resolved and peak vertical force increased from 43% to 92% of the contralateral pelvic limb. Serial ultrasonographic examinations revealed improved but incomplete restoration of normal linear fiber pattern of the gastrocnemius tendon.

Conclusions: Findings suggest that autologous mesenchymal stem cell transplantation with custom, progressive, dynamic orthosis may be a viable, minimally invasive technique for treatment of calcaneal tendon injuries in dogs.

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Repair of Chronic Complete Traumatic Rupture of the Common Calcaneal Tendon in a Dog, Using a Fascia Lata Graft

Case Report and Literature Review

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Keywords

Achilles tendon, tensor fascia lata, graft

The following case report describes the successful repair of a chronic complete traumatic rupture of all components of the Achilles tendon with loss of tendon length, in a 3-month-old puppy, using a tensor fascia lata free graft. Due to the young age of the animal no internal fixation was used to protect the graft, and external coaptation was used instead. Achilles tendon rupture is a relatively common injury in humans and many methods of repair are reported for acute and chronic ruptures. The medical and veterinary literature is reviewed with regard to the pathogenesis and treatment of Achilles tendon rupture.

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Summary

A 3-month-old male Cocker Spaniel was presented with the complaint of chronic right hind leg lameness. The owner described superficial trauma at the area of the hock, which was noticed immediately after delivery. History, habitus, physical examination, and radiography suggested rupture of the common calcaneal tendon. This report describes the successful repair of complete rupture of the common calcaneal tendon, with loss of tendon length, using a fascia lata free graft.

Introduction

The common calcaneal tendon consists of three components that attach to the tuber calcis. The tendon of the gastrocnemius muscles, which is the main component, attaches on the proximal-lateral surface of the tuber calcis. The tendon of the superficial digital flexor caps the tuber calcis, attaching on each side and continues

distally to insert on the proximal-caudal border of the second phalanges of the digits. The common tendon of the gracilis, biceps femoris and semitendinosus attaches on the medial side of the tuber calcis (24).

Management of an Achilles tendon rupture associated with a significant loss of tendon length presents a confusing surgical dilemma. This is due to the fact that many surgical solutions have been proposed in the human and veterinary literature. Failure to restore anatomical length may result in less than optimal function (20). Untreated, the proximal stump of the tendon retracts and may create a significant defect. Repair of the Achilles tendon is considered delayed when the ruptured tendon has been neglected for at least 4 weeks (20). Reports of successful repair of partial rupture of the common calcaneal tendon have infrequently been published in the veterinary literature (6, 10, 11, 29). Treatment of rupture of one component of the common calcaneal tendon, the superficial flexor tendon, with loss of tendon length using fascia lata graft was reported (6). Successful

Post-Operative Immobilization

- Support for surgical repair
 - 4-6 wks
- Calcaneo-tibial screw
- Transarticular fixator
 - Linear or circular
- Coaptation
 - Splint or orthotic



Transarticular Ex Fix

- Fixator type
 - Linear, circular, or hybrid
- Rigid hock immobilization
- At home care
 - Select owners carefully
- Pin tract morbidity
- Remove in 3-6 wks



What About Conservative Management?

- Rarely a primary treatment for carpal & tarsal instability or fracture
 - Commonly used with surgical repair
- Low grade sprains may be treated conservatively
 - No instability present
- Coaptation
- Orthotics



Outcome following surgical repair of achilles tendon rupture and comparison between post-operative tibiotarsal immobilization methods in dogs

28 cases (1997–2004)

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Summary

Surgical treatment of Achilles tendon rupture in dogs is generally associated with a favourable outcome, although the recovery time to best function is relatively long at 20.2 weeks. Dogs with injuries of less than 21 days duration may have a better functional outcome. When comparing external fixator application to splint or cast management, initial tibiotarsal immobilization method does not significantly affect the complication rate, duration of immobilization, recovery time, or functional outcome.

Keywords

Achilles tendon, surgery – tendon, joint immobilization

Vet Comp Orthop Traumatol 2006; 19: 246–9

Introduction

The Achilles (common calcaneal) tendon is made up of three structures: the tendons of the gastrocnemius and superficial digital flexor, and the common tendon of the biceps femoris, gracilis, and semitendinosus. Rupture of one or more components is a disabling injury in dogs, and surgical repair is the generally accepted recommendation for effective return to function. In dogs the injury is generally classified according to the age of the injury (acute vs. chronic), and the degree of tendon involvement (partial vs. complete) (1). Partial rupture, with one or more tendon components intact, is reportedly more common in dogs (2).

Following surgical repair, in order to counteract large tensile forces during healing, immobilization of the tibiotarsal joint is recommended. Primary tenorrhaphy using different suture patterns has been described (3–5). Augmentation methods have been used when the length or integrity of tendon is insufficient (6, 7). Several methods of joint immobilization have been advocated, including the application of a transarticular external skeletal fixator (TESF) (8, 9), placement of a calcaneo-tibial bone screw (10), and various configurations of splints and casts (1, 5). These small case series also provide the only published evaluation of outcome following Achilles tendon repair in dogs, and, to date none of the studies has compared the associated complications and functional outcome of different methods of initial joint immobilization.

We hypothesized that immobilization with TESF would result in longer surgical time and greater cost of surgery, but would lead to a quicker return of function with fewer complications compared to external coaptation. In addition, we hypothesized that the overall long-term function after recovery would be the same for both groups, with most dogs regaining excellent to normal function of the limb. The purpose of the study reported herein was to provide information regarding recovery and long-term outcome after surgical management of Achilles tendon rupture in a large group of dogs, and to compare immobilization with TESF to standard external coaptation using splints or casts.

Methods, results, and discussion

The medical records of all dogs that underwent surgical Achilles tendon repair at the University of Minnesota between 1997 and 2004 were reviewed. Follow-up information regarding post-operative management and final outcome was obtained by reviewing the medical record, and contact with the referring veterinarian and client interview. The length of time to best function from surgery was estimated to the nearest number of weeks, and functional outcome score was assigned on a scale from one to six (1 representing normal function with no residual lameness, and 6 representing severe lameness preventing regular use of the limb or

- No difference
- 20 week recovery
- Good outcome

Outcome

Paper

Retrospective study of Achilles mechanism disruption in 45 dogs



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[Author affiliations](#) +

Abstract

Forty-five cases of canine Achilles mechanism disruption were reviewed, mostly involving medium-sized dogs, among which dobermanns, labradors and border collies were most commonly represented. Most cases were acute in onset (66.7 per cent), and were usually closed injuries (75.6 per cent). In the majority of cases, the damage involved all tendons (26.7 per cent), all tendons except the superficial digital flexor tendon (22.2 per cent), or the gastrocnemius alone (20 per cent). Damage most commonly occurred at the tendo-osseous junction (60 per cent), with injury occurring less commonly at the musculotendinous junction (20 per cent) or in the body of the tendon (13.3 per cent). A plantigrade posture was not predictive of involvement of specific tendons, but was more likely if the injury involved the musculotendinous junction. The most common method of treatment was a primary tendon repair using polydioxanone suture in a locking-loop pattern, with placement of a temporary calcaneotibial screw and cast. The outcome was not significantly influenced by whether the injury was open or closed, the duration of the injury, the tendons involved, or the method of repair. Complications were recorded in 16 cases (35 per cent), of which 10 were minor and six major. Complications were significantly more likely if the damage involved the body of the tendon. Long-term follow-up was available for 19 dogs; the outcome of surgery was considered to be good to excellent in 18 dogs.

Outcome

Scientific Article

Ability to work and owner satisfaction following surgical repair of common calcanean tendon injuries in working dogs in New Zealand

AJ Worth, F Danielsson, JP Bray, HM Burbidge & WJ Bruce

Pages 109-116 | Accepted 18 Aug 2003, Published online: 22 Feb 2011

Abstract

AIM: To report the long-term outcome (return to work and owner satisfaction) following surgical treatment of common calcanean tendon (Achilles tendon) injuries in working dogs in New Zealand.

METHODS: Ten New Zealand Huntaway or Heading dogs (working Collies) with complete or partial tears of the common calcanean tendon, were treated using locking-loop suturing and casting, with (7) or without (3), a calcaneo-tibial screw. All dogs were actively in work on sheep or cattle farms at the time of injury, and return to work was the desired outcome. Ability to work and owner satisfaction were investigated using a telephone questionnaire at a mean followup interval of 14.6 months.

RESULTS: Overall, 7/10 dogs returned to full or substantial levels of work. Post-operative complications occurred in two dogs that did not return to full or substantial levels of work. Moderate persistent lameness (score 3 on a scale of 0–5) was present in 2/7 dogs that returned to full or substantial levels of work, equating to a 71% good-to-excellent functional outcome within this group. Seven owners felt the financial investment in opting for surgical repair was worthwhile. A screw and cast method of rigid immobilisation was thought to be superior to casting alone.

CONCLUSIONS: Surgical treatment of common calcanean tendon injury in working dogs carries a good prognosis if an appropriate tenorrhaphy technique is used and rigid immobilisation is achieved for 6 weeks. Care must be taken to limit post-operative complications.

CLINICAL RELEVANCE: This study justifies the use of surgical repair of such injuries in the working dog even when return to work is the only acceptable outcome.

Orthotics

- Custom brace
- Support joint or limb segment
- Indications
 - Mild Ligamentous instability
 - Calcanean tendon sprain
 - Systemic contra-indication for surgery
 - Protect surgical repair



Orthotics

- Creation
 - Cast of limb segment
- Materials
 - Carbon fiber
 - Neoprene
 - Rubber
 - Aluminum
- Durability & longevity
- Ease of application



Arthrodesis

- pantarsal arthrodesis
- if primary repair fails
- good results
- loss of ROM



Summary

- Calcaneal tendon injuries result in marked dysfunction
- Tears can be complete or partial
- Complete tears require good approximation of the tendon and stable repair and long term immobilization in an extended position
- Partial tears require prolonged immobilization in extension and possible surgery



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