



## Newsletter

### CALCANEAL TENDON TEARS IN DOGS

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#### View from the floor!

Rehabilitative medicine is not about 'conservative management' no-matter-what! It can also be about identifying cases that require surgical management and directing the dog-owner to seek a surgical consult. Rupture of the Achilles tendon is one such scenario whereby surgical management will yield a better result than conservative management. Please note I am not talking about Achilles tendinopathy lesions... that's another story! For information on tendinopathy rehab, please read the article on Canine Athlete Considerations: Soft Tissue Injuries of the Shoulder in the Canine Athlete. THIS newsletter is dedicated to Achilles tendon ruptures. Firstly, learn about the morphology and biomechanical properties of the Achilles / Calcaneal tendon, then look at how and where they rupture. Next you will be directed to two studies that look at post-operative immobilization techniques. Along the way challenge yourself with the question of 'WHY do I care?' and 'HOW does this impact my clinical practice?' Happy reading and happy learning! Cheers! Laurie

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"The average dog is a nicer person than the average person." - Andrew A. Rooney

# Review of the Literature

**Jopp I, Reese S. Morphological and biomechanical studies on the common calcaneal tendon in dogs. Vet Comp Orthop Traumatol 2009; 22: 119 – 124.**

The common Calcaneal tendon in dogs is comprised of 3 tendons arising from 5 muscles: medial & lateral gastrocs; superficial digital flexor (SDF) muscle; & a common tendon arising from biceps femoris, gracilis & semitendinosus.

Spontaneous rupture at the distal part of the gastrocnemius tendon (GT) is the second most common non-traumatic tendon injury in dogs. The other portions of the calcaneal tendon do not seem to have a predisposition to rupture.

It has been shown in humans and other species, that there are local variations in microscopical structure along certain tendons, such as fibrocartilaginous areas.

It has been hypothesized that the fibrocartilaginous areas within the tendon exhibit less tensile strength than parallel fibered areas but no research had been done to date to elucidate where along the calcaneal tendon damage tended to occur or whether it correlated with the fibrocartilaginous areas.

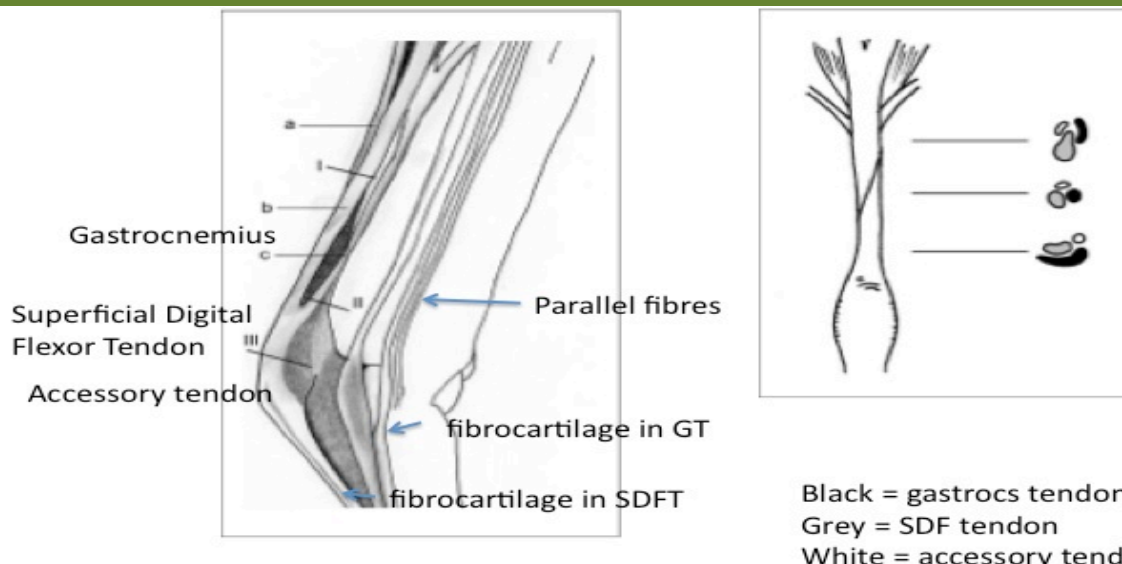
**Findings:**

Both the gastrocnemius (GT) and superficial digital flexor tendons had multiple low vascularized fibrocartilaginous areas within their distal portions as opposed to regular parallel fibered areas in the proximal regions.

The distal sections of both the GT and SDFT had lower

tensile strength (force to failure when compared to cross sectional area) than the proximal sections. There was no significant difference in tensile load (force to failure when compared to body weight of the dog) from proximal to distal segments of either tendon. However, the tensile load of the GT was significantly less in both the parallel fibered and fibrocartilage areas when compared to the SDFT.

Spontaneous ruptures of the canine GT reportedly occur just proximal to the insertion on the calcaneus. This correlates with the area of fibrocartilage found in this study.





# Review of the literature

**Corr SA, Draffan E, Kulendra S, et al. Retrospective study of Achilles mechanism disruption in 45 dogs. Vet Rec 2010; 167: 407 – 411.**

Palpate the calcaneal tendon from the insertion point on the calcaneus to the musculotendinous junction. If heat, thickness, or tenderness is detected, the animal may have a calcaneal tendon lesion. Measuring the width of the tendon from side to side is a good objective measure to report.

Most Achilles tendon injuries are reported to occur in medium- to large-breed dogs, either during normal activity, or as a result in trauma. Animals frequently present with an initial non-weight-bearing lameness that resolves over a period of a few weeks, with the animal gradually developing a plantigrade stance (i.e. the hock hyperflexes). In cases where the SDFT alone remains intact, there is a characteristic ‘clawing’ posture of the foot.

## Findings:

Most cases involved medium-sized dogs (Dobermans, Labradors, & Border Collies were over-represented in the patient series). Sixty-six percent of the cases were acute onset.

In the majority of cases, the damage involved all tendons (26.7%), all tendons except the SDFT (22.2%), or the gastrocnemius tendon alone

(20%). Damage tended to occur at the teno-osseous junction in 60% of cases, the musculotendinous junction in 20% of cases, or in the body of the tendon in 13.3% of cases.

A plantigrade posture was not predictive of the involvement of specific tendons, but was more likely if the injury involved the musculotendinous junction.

The most common method of treatment was surgical repair using suture material in a locking-loop pattern, with placement of a temporary calcaneotibial screw and cast. Complications were reported in 35% of cases. Long-term follow up was only available for 42% of the dogs. Of this group, there was 95% probability of good to excellent outcome.

Note, other papers have reported 71% favourable outcomes with surgery. Human studies report 54.5 – 76% success with conservative management. The difference with human

management likely has more to do with early detection and management prior to full rupturing of a tendon.

## Summary & Clinical Relevance

*Based on these two studies, the rehab practitioner should better be able to recognize the clinical presentation of a calcaneal tendon strain or rupture. As therapists working with canine athletes, manual evaluation of the calcaneal tendon should be conducted on a regular basis when providing fitness check ups or evaluations. Owners of canine athletes should also be shown how to evaluate the calcaneal tendon in their dog for early identification (and hopefully guided, specific, targeted therapy) to treat these tendon lesions when they are treatable prior to rupture.*



Claw-like posture



Plantigrade posture

## Review of the Literature

**Nielsen C, Pluhar GE. Outcome following surgical repair of Achilles tendon rupture and comparison between post-operative tibiotarsal immobilization methods in dogs – 28 cases (1997 – 2004). Vet Comp Orthop Tramadol 2006; 19: 246 – 249.**

The mean time from injury to surgery was 85 days (range 1 to 772 days), with a median of 26 days

Complications were generally attributable to the coaptation method rather than to the surgical repair.

Considering only the final surgery on the affected tendon for all 28 dogs to maintain independence of samples, 13 had complications recorded

When the dogs were divided by initial coaptation type, there were 16 dogs in the TESH (transarticular external skeletal

fixator) group and 11 dogs in the splint/cast group

Complications were seen in 15 of 28 dogs (46%) and were generally related to the immobilization method rather than to the tenorrhaphy

Although all of the dogs with major complications were in the TESH group, there was no difference in the proportion of dogs with reported complications (minor, major, or overall) between the two groups.

There was not any significant difference between groups, with

respect to total duration of coaptation nor recovery time to 'best function'.

The results support our hypothesis that the outcome following surgical repair of Achilles tendon rupture in dogs is favourable irrespective of either the method of repair or initial joint immobilization. Most of the dogs (78%) with complete follow-up available had returned to an acceptable level of function.

Using a TESH for initial immobilization resulted in significantly longer surgical time and greater initial cost when compared to using a splint or cast.

## Review of the Literature

**Lister SA, Renberg WC, Rousch JK. Efficacy of immobilization of the tarsal joint to alleviate strain on the common calcaneal tendon in dogs. Am J Vet Res 2009; 70: 134 – 140.**

Healing of tendon injuries is problematic because it can be difficult to achieve control of weight bearing and exercise restrictions.

**Study objective:** To measure strain in the common calcaneal tendon during trotting in dogs and to compare strain before and after immobilization of the tarsal joint.

**Procedure:** In 6 dogs, a microminiature strain gauge was surgically implanted on the tendinous portion of the gastrocnemius muscle. Surface electromyography (EMG) values, percentage strain, and ground reaction forces were measured before and after immobilization.

Peak vertical force; vertical impulse; initial, maximum, and final strain; and peak-to-peak EMG amplitude were recorded.

**Results:** Continued muscle contraction was evident after immobilization. There was no significant difference in maximum strain after immobilization, compared with maximum strain during normal motion

**Conclusions:** Immobilization of the tarsal joint did not eliminate calcaneal tendon strain during weight bearing in dogs. Consideration of these findings could be important in adjusting current treatment

**"I care not for a man's religion whose Dog and cat are not the better for it."**

**- Abraham Lincoln**

### CLINICAL IMPLICATIONS

As rehab professionals, when dealing with post-operative tibiotarsal joint immobilization cases, we should consider advising clients restrict their dog activity regardless of the immobilization device utilized. Immobilization can result in complications, which could potentially be compounded and/or compromise the integrity of the calcaneal tendon repair, if the owners (or surgeon) believe that the external coaptation technique is actually protective of the surgical repair.

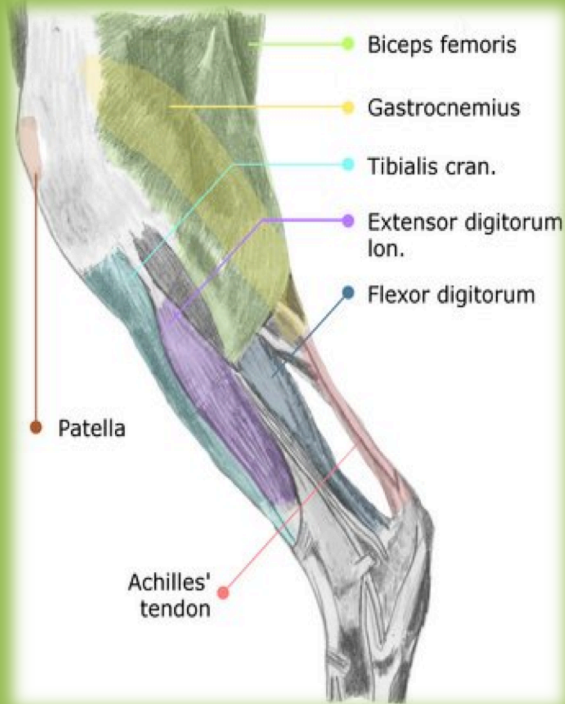
### NOTES from the human-side

**Kangas J, Pajala A, Ohtonen P et al. Achilles tendon elongation after rupture repair: a randomized comparison of 2 postoperative regimens. Am J Sports Med 2007; 35 (1): 59 – 64.**

Achilles tendon elongation was somewhat less in the early motion group and correlated with the clinical outcome scores. We recommend early functional postoperative treatment after Achilles rupture repair.

**Jacob KM, Paterson R. Surgical repair followed by functional rehabilitation for acute and chronic Achilles tendon injuries: excellent functional results, patient satisfaction and no reruptures. ANZ J Surg 2007; 77 (4): 287 – 291.**

We believe that surgical repair using this technique associated with an early return to protected full weight-bearing ambulation and an active early rehabilitation programme provides not only excellent functional results, patient satisfaction and a zero rerupture rate, but also much less morbidity in the first 3 months and a quicker overall recovery compared with non-operative treatment.



## Clinical Thoughts

Careful, purposeful rehab in the early post-operative phase of Achilles tendons repairs may be useful to both aid in recovery and provide optimal owner education and advisement.

***“If there are no Dogs in Heaven, then, when I die, I want to go where they went.”***

**- Will Rogers**



### *Next Issue*

Rehabilitation of Surgical Tendon Repairs



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