EVALUATION OF NON-SURGICAL TREATMENT OPTIONS FOR TYPE 2C ACHILLES TENDINOPATHY

Purpose: The purpose of this study is to investigate the effectiveness of non-surgical management of Type 2 common calcanean (Achilles) tendinopathy.

Study Design: The study will objectively evaluate the outcome of non-surgical treatment via tarsal orthosis, rehabilitation and pain management of Achilles tendinopathy in (n=12) dogs. Efficacy of the treatment will be evaluated by owner questionnaires, objective gait analysis, ultrasound, x-rays, activity counts and veterinary assessment. The study spans over one year and involves approximately 10 visits to the VTH.

Inclusion Criteria*:

- Body weight ≥15kg
- Irregular gait/visually identifiable unilateral lameness that is due to Type-2c Achilles Tendinopathy
- Palpable presence of swelling of Achilles tendon insertion and visible “crab-claw” appearance
- No palpable abnormalities of the other Achilles tendon
- At home assessment by owner (owner questionnaires) showing impairments that can be defined (such as not jumping into truck, less active etc.)
- Generally healthy with no other indication of systemic disease (confirmed through bloodwork)
- Owner agrees to:
  - Adhere to recheck schedule as outlined below
  - Adhere to current treatment regime unless a change is recommended by us or primary DVM (in which case owner agrees to notify us)
  - Allow canine tracking device on CSU issued collar to be worn 24/7 for duration of the study
  - Fill out DAILY activity/medication log for duration of the study
  - Fill out owner questionnaires at several rechecks
Exclusion Criteria*:

☐ Previous surgery of affected tendon/tarsus
☐ Animals not suitable for functional orthosis fittings due to anatomy/build
☐ Animal not suitable for repeated appointments, gait analysis etc. (such as stressed animals or due to behavioral issues)
☐ Tendinopathy of the other Achilles tendon
☐ Owner wanting to pursue regenerative medicine or surgical treatment in addition to device
☐ Concurrent CCLD of affected stifle (based on palpation, no radiographs necessary to r/o stifle disease unless clinically indicated)
☐ Other orthopedic or neurological conditions that affect or are suspected to affect the gait significantly
☐ Owner unwilling/incapable to return to CSU for follow-up visits for a 1 year duration
☐ Owner unwilling to allow sedation for the ultrasound evaluations

Benefits of Participation:

- Tarsal orthosis free of charge
  - Please note that fulfillment of the recheck schedule at CSU is required to receive the orthosis free of charge
- Rechecks, device adjustments for the duration of the study (1 year)
- Radiographs of the tendon at 0 and 52 weeks
- Ultrasound of the tendon at 0, 12, 24 and 52 weeks to assess progression of healing
- Owner expense:
  - Initial enrollment visit and bloodwork required to ensure enrollment is feasible
  - Physical therapy visits

Required Visits:

The study requires owner compliance of pain assessment questionnaires, sedated procedures for radiology/ultrasound, gait analysis, physical therapy (during the first 3 months or until your dog returns to normal gait) and a canine activity monitor to be worn by your dog. A total of approximately 10 visits are required over the course of 12 months:

Date: ___________(Week 0) – Enrollment visit**:

☐ Orthopedic and general physical exam at owner expense
☐ Baseline bloodwork at owner expense

Please contact Kelsie Condon at Kelsie.Condon@colostate.edu or by calling (970) 297-5000 with any questions
Gait analysis to quantify degree of lameness
Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
CBPI to quantify daily limitations
CSOM to quantify daily limitations – define current limitations with owner****
Tarsal angles (NOTE: should be 165° or greater) ****
- Tarsal standing angle measured during square stance
- Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
- Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
- Thickness of Achilles tendon just proximal to the calcaneus (in mm)

Sedated radiographs of tibia (if not performed within the last 4 weeks)
Sedated ultrasound of affected tendon – assign tendon score*****
Orthosis molding with GlideWear and activity monitor placeholder (NOTE: notify Orthopets that this is study participant)
Rehabilitation visit #1: Phase I (pain management and inflammation treatment)
Attach Actical activity monitor to pet
Provide owner with activity log

Date: __________ (~Week 2 – delivery of device)
General physical and orthopedic exam****
Tarsal angles (NOTE: should be 165° or greater) ****
- Tarsal standing angle measured during square stance
- Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
- Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
- Thickness of Achilles tendon just proximal to the calcaneus (in mm)
Gait analysis to quantify degree of lameness
Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
Collect owner activity log/discuss any changes in activity/lameness/systemic health****
Delivery of orthosis (device fitting with tibiotalar joint at 165° and the metatarsophalangeal joint at 75° with external component if SDF-injury present based on clinical indication)
Rehabilitation visit #2: Phase II (weight bearing with device and prescription of home program to promote strengthening of co-joint muscles)
Attach Actical activity monitor to device
Retrieve data from Actical attached to collar to verify it is working (do not reset)
Owner to start phase 1 of the rehabilitation protocol (weight bearing exercises)
Date: ________ (~Week 3 – 1 week after delivery)

- General physical and orthopedic exam****
- Tarsal angles (NOTE: should be 165° or greater) ****
  - Tarsal standing angle measured during square stance
  - Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  - Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  - Thickness of Achilles tendon just proximal to the calcaneus (in mm)
- Device recheck
- PRN Rehabilitation visit only if not weight bearing with device
- Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
- Collect owner activity log/discuss any changes in activity/lameness/systemic health****
- Retrieve data from Actical attached to device to verify it is working (do not reset)

Date: ________ (~Week 4 – 2 weeks after delivery)

- General physical and orthopedic exam****
- Tarsal angles (NOTE: should be 165° or greater) ****
  - Tarsal standing angle measured during square stance
  - Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  - Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  - Thickness of Achilles tendon just proximal to the calcaneus (in mm)
- Device recheck
- PRN Rehabilitation visit only if not weight bearing with device
- Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
- Collect owner activity log/discuss any changes in activity/lameness/systemic health****
- Gait analysis to quantify degree of lameness

Date: ________ (~Week 10 – 8 weeks after delivery)

- General physical and orthopedic exam****
- Tarsal angles (NOTE: should be 165° or greater) ****
  - Tarsal standing angle measured during square stance
  - Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  - Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  - Thickness of Achilles tendon just proximal to the calcaneus (in mm)
Device recheck
- Increase tarsal flexion angle by 10° (NOTE: only if equal standing angle to unaffected side is documented – if not delay as clinically indicated)
- Rehabilitation visit #3: Phase III graded return to activity schedule
- Subjective Outcome Scoring (SOS)
- Collect owner activity log/discuss any changes in activity/lameness/systemic health****
- Gait analysis to quantify degree of lameness

------------------------------ IF STANDING ANGLE DIFFERENT THAN UNAFFECTED SIDE-----------------------------

⇒ RECHECK q 2 WEEKS UNTIL EQUAL STANDING ANGLE ACCOMPLISHED

Date: __________ (Week _____)
- General physical and orthopedic exam****
- Tarsal angles (NOTE: should be 165° or greater) ****
  - Tarsal standing angle measured during square stance
  - Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  - Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  - Thickness of Achilles tendon just proximal to the calcaneus (in mm)
- Device recheck
- Continue with rehabilitation phase 2
- Subjective Outcome Scoring (SOS)
- Collect owner activity log/discuss any changes in activity/lameness/systemic health****
- Gait analysis to quantify degree of lameness

---------------------------- ONCE EQUAL STANDING ANGLE AS UNAFFECTED SIDE-----------------------------

Date: __________ (~Week 13 – if equal standing angle at 8 weeks)
- General physical and orthopedic exam****
- Tarsal angles (NOTE: should be 165° or greater) ****
  - Tarsal standing angle measured during square stance
  - Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  - Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  - Thickness of Achilles tendon just proximal to the calcaneus (in mm)
☐ Device recheck
☐ Increase tarsal flexion angle by 10° (NOTE: only if no deterioration)
☐ Collect owner activity log/discuss any changes in activity/lameness/systemic health****
☐ Gait analysis to quantify degree of lameness
☐ Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
☐ CBPI to quantify daily limitations
☐ CSOM to quantify daily limitations
☐ Actical data download of both devices (do not reset)

Date: __________ (~Week 16 – if no set-back in standing angle)
☐ General physical and orthopedic exam****
☐ Tarsal angles (NOTE: should be 165° or greater) ****
  ☐ Tarsal standing angle measured during square stance
  ☐ Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  ☐ Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  ☐ Thickness of Achilles tendon just proximal to the calcaneus (in mm)
☐ Device recheck
☐ Increase tarsal flexion angle by 10°
☐ Collect owner activity log/discuss any changes in activity/lameness/systemic health****
☐ Gait analysis to quantify degree of lameness
☐ Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
☐ CBPI to quantify daily limitations
☐ CSOM to quantify daily limitations

Date: __________ (~Week 19 – if no set-back in standing angle)
☐ General physical and orthopedic exam****
☐ Tarsal angles (NOTE: should be 165° or greater) ****
  ☐ Tarsal standing angle measured during square stance
  ☐ Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  ☐ Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  ☐ Thickness of Achilles tendon just proximal to the calcaneus (in mm)
☐ Device recheck
☐ Sedated ultrasound of affected tendon – assign tendon score*****
☐ Increase tarsal flexion angle by 10°, removal of paw segment, switch to Dacron strap

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Rehabilitation visit #4: Phase 4 (concentric and eccentric in the device, initiate fast twitch muscle contractions, continue controlled walking)

- Collect owner activity log/discuss any changes in activity/lameness/systemic health****
- Gait analysis to quantify degree of lameness
- Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
- CBPI to quantify daily limitations
- CSOM to quantify daily limitations
- Actical data download on both devices (do not reset)

Date: __________ (Week 24)

- General physical and orthopedic exam****
- Tarsal angles (NOTE: should be 165° or greater) ****
  - Tarsal standing angle measured during square stance
  - Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  - Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  - Thickness of Achilles tendon just proximal to the calcaneus (in mm)

- Device recheck
- If clinically indicated and confirmed via diagnostics (tendon US) and OGA data, consider transition to ‘as needed’ sports brace (to be used during high impact activity), otherwise continue to use of orthosis in current status.
- Collect owner activity log/discuss any changes in activity/lameness/systemic health****
- Gait analysis to quantify degree of lameness
- Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
- CBPI to quantify daily limitations
- CSOM to quantify daily limitations
- Actical data download on both devices (replace battery-do not reset)
- Check/Replace battery in both Actical devices

Date: __________ (Week 36)

- General physical and orthopedic exam****
- Tarsal angles (NOTE: should be 165° or greater) ****
  - Tarsal standing angle measured during square stance
  - Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  - Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  - Thickness of Achilles tendon just proximal to the calcaneus (in mm)
Device recheck
Rehabilitation visit #5 for prescription of graded return to activity schedule
Collect owner activity log/discuss any changes in activity/lameness/systemic health****
Gait analysis to quantify degree of lameness
Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
CBPI to quantify daily limitations
CSOM to quantify daily limitations

Date: __________(Week 52)
General physical and orthopedic exam****
Device recheck
Tarsal angles (NOTE: should be 165° or greater) ****
  Tarsal standing angle measured during square stance
  Tarsal standing angle measured during square stance when lifting up contralateral limb (if allowable per vet assessment)
  Gastrocnemius flexibility measured in lateral recumbence (stifle in extension, hip in standing angle -> measure the flexion angle of the tarsus)
  Thickness of Achilles tendon just proximal to the calcaneus (in mm)
Collect owner activity log/discuss any changes in activity/lameness/systemic health****
Gait analysis to quantify degree of lameness
Subjective Outcome Scoring (SOS) to quantify degree of physical limitations
CBPI to quantify daily limitations
CSOM to quantify daily limitations
Sedated radiographs of the tibia
Sedated ultrasound of affected tendon – assign tendon score*****
Actical data download (both devices)