Achilles Tendinopathy:

Modern Treatment & Rehabilitation

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What are we going to be discussing?

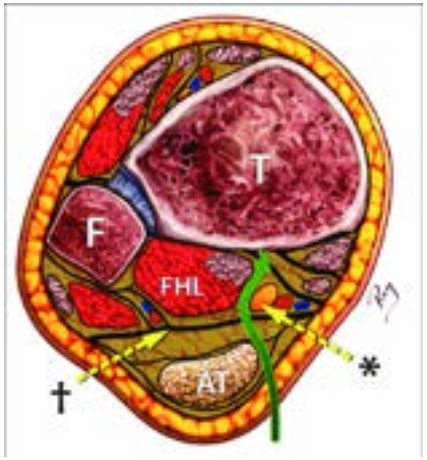
1. Understanding Tendon Biology
2. Assessment Framework
3. Calf-Capacity Testing
4. Evidence-Based Treatment & Exercise Protocols

What are we going to be discussing?

STOP RESTING TENDON INJURIES!!!

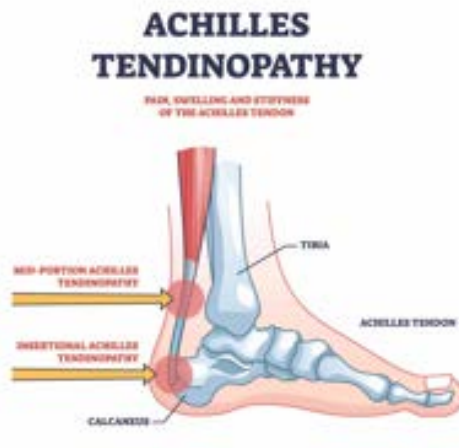
1. Tendon Biology

- Load = Adaptation
- Structure leads to Function
- Pain does **NOT** equal "damage"



Primary Types of Achilles Tendinopathy

1. Mid-Tendon
2. Insertional



"If they present with a diagnosis, don't let them *carry the load* of that diagnosis."

- Dr. Ebonie Rio

(Words Matter!)

Never use the term "tendonitis". Ever.

(Words Matter!)

Types of Tendon Loading

1. Tensile
2. Compression
3. Combination
4. Shearing Friction

Types of Tendon Loading

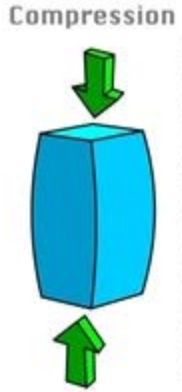
1. Tensile:

- Rapid, high magnitude loads (i.e., jumping)
- Associated with *Mid-Tendon* issues
- Using the achilles like a spring

Types of Tendon Loading

2. Compression:

- Load experienced at an end-range position (i.e., dorsiflexion)
- Associated with *Insertional* Tendinopathy



Types of Tendon Loading

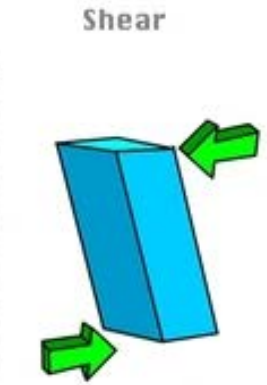
3. Combination:

- Rapid, high magnitude loads at end ranges (i.e., tensile & compressive loads)
- Pushing off from a dorsiflexed position

Types of Tendon Loading

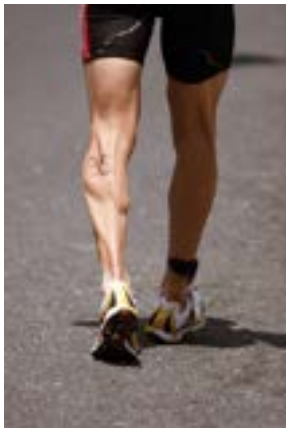
4. Shearing Friction

- Low magnitude load on the paratendon during repetitive, large ROM activities (i.e., cycling, swimming, rowers)
- Associated with paratendinopathy



Typical Tendon Behavior

- Painful at beginning of exercise/movement
- Feel better with warm-up
- Pain often increases the day AFTER loading (24-hour rule)



II. Assessment Framework

A. Subjective Assessment

B. Objective Assessment

A. Subjective Assessment

WHERE?

- Is the pain focal or diffuse?
- If focal to the mid-tendon or insertion, most likely tendinopathy!
- If diffuse, it is likely a different pathology

A. Subjective Assessment

PROVOCATIVE LOADS?

- Rapid, high tensile loads = pain
  - Likely achilles tendinopathy!
- Pain in dorsiflexed position = Insertional Tendinopathy
- Low loads not at end range = paratendinopathy

A. Subjective Assessment

PAIN BEHAVIOR?

- Pain feel better after getting warmed up?
- Does it feel worse the next day?
    - If yes, then likely tendon-related pain!

B. Objective Assessment

OBSERVATION:

- Scars?
- Gross Muscle Wasting?
- Footwear Abnormalities?

B. Objective Assessment

- Should already have a hypothesis based on the *subjective* assessment
- Purpose = Assess and gauge the patient's current level of function (i.e., ROM, strength, motor control, endurance, etc..)
- Don't worry too much about technique at this point!

B. Objective Assessment

When we observe load testing, ask the patient TWO questions…

1) What is your pain level (0 - 10)?
2) Can you point to the pain (local vs. diffuse)?

B. Objective Assessment

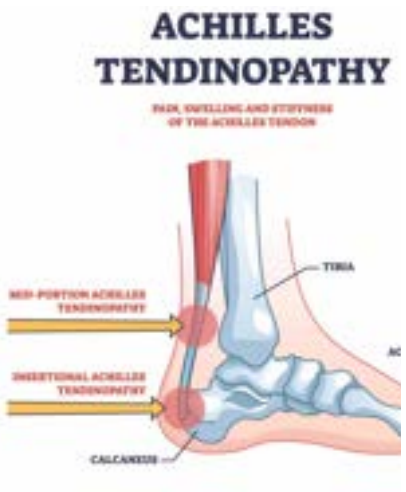
PROGRESSIVE LOAD TESTING:

- 2-leg Calf Raises x 5 reps - *(slow / low load)*
- 1-Leg Calf Raises x 5 reps - *(slow / low load)*
- 2-leg Vertical Continuous Hops x 5 reps - *(faster / higher load)*
- 1-leg Vertical Continuous Hops x 5 reps - *(faster / higher load)*
- 1-leg Max Height Continuous Hops x 3 reps - *(very high load)*
- 1-Leg Forward Continuous Hops x 3 reps - *(very high load)*

B. Objective Assessment

Typically….

- Mid-Tendinopathy = pain with hopping, but not with slow, controlled calf raises
- Insertional Tendinopathy = pain with *deficit* calf raises



B. Objective Assessment

Watch for any "cheating" during the assessment!

(i.e., hopping flat footed, etc)

B. Objective Assessment

Make sure to evaluate the entire kinetic chain!

III. Calf Capacity Testing

- Done after we've established a diagnosis
- Best way = 1-leg calf raises to fatigue
- No/little equipment needed!

III. Calf Capacity Testing

- Also gives you a chance to make sure patients are doing calf raises PROPERLY!

III. Calf Capacity Testing

How to Cue your patient:

- Stand facing a wall
- Bent-arm distance away
- Wall prevents patient from "pulling themself up"

III. Calf Capacity Testing

How to Cue your patient:

1. Stand on 1-leg
2. 1-sec up / 1 sec down
3. Keep knee straight
4. Don't lean into the wall
5. Don't "roll" ankle out (push through the 1st toe!)
6. Go up to FULL HEIGHT each rep!

III. Calf Capacity Testing

TESTING ORDER:

1. Bilateral to single-foot "shifts" (look for dropping of heel height when on 1-foot)

III. Calf Capacity Testing

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III. Calf Capacity Testing

TESTING ORDER:

2. Single-Leg Calf Raises:
   - As many as possible!
   - 1 secs up / 1 secs down
   - "3 Strike" rule for bad technique

IV. Treatment

General Rules:

- Tendons don't care about weight, they care about *speed*!
- Pain = 3-4 out of 10 (or less!)
  - During AND 24-hour later

IV. Treatment

General Rules:

- Phase 1 & 2 of rehab can start *immediately* for tendinopathy with little risk for exacerbation!!!
- If Phase 1 & 2 exercises make their pain worse….re-assess your diagnosis!

IV. Treatment

- Avoid overly passive treatment approaches (i.e., e-stim, US, etc…)
- Avoid corticosteroids!

Tendinopathy Rehab

Starts with minimal tendon loading and progresses to maximal tendon loading as the athlete prepares to return to sport!

Exercise Protocols

FOUR PHASES:

1) Isometric
2) Isotonic
3) Energy Storage
4) Energy-Storage-and-Release

Exercise Protocols

Phase 1: Isometrics:

- They reduce pain!
- Modify cortical changes that occur with chronic tendinopathy (i.e., cortical inhibition of the muscle related to that tendon)
- Can be done *prior* to practice or game

Exercise Protocols

Phase 1: Isometrics:

- Variations of heel raises
- Hold contraction for 45 seconds x 5 reps
- Should hit muscular failure toward end of each rep.
- Should be done every day!

Phase 1: Isometrics

Exercise 1: Bodyweight Single Leg Holds

Add weight if needed

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Phase 1: Isometrics

Exercise 1: Single Leg Heel Raise with Holds

Add weight as needed (barbell, dumbbells, etc…)

- For Insertional Tendinopathy = hold in HIGH position
- For Mid-Tendon Tendinopathy = hold in middle position

Phase 1: Isometrics

Exercise 1: Single Leg Heel Raise with Holds

- Regression = 2-leg standing heel raises and/or seated heel raise holds
- Prefer to do 1-leg when possible
- Patients should spend *minimal* time in this phase!

Phase 2: Isotonics

Rules:

- Increase intensity and full ROM heel raise variations (standing and sitting)
- Goal = improve strength & strength-endurance
- Strength = 4 sets of 8 reps (2 secs up, 3 secs down)
- Strength-Endurance = 4 sets of 10-30 reps (1 sec up/down)

Phase 2: Isotonics

Rules:

- Tempo should be controlled (don't 'bounce' at the bottom!)
- Perform every other day
- Use good technique!

Phase 2: Isotonics:

Exercise 1: Barbell Single Leg Heel Raises

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Phase 2: Isotonics:

Exercise 1: Barbell Single Leg Heel Raise

- One session of 4 sets of 8 reps
- Next session of 4 sets of 10-30 rep
- 2 secs up / 3 secs down

Phase 2: Isotonics:

Exercise 2: Seated Calf Raises (1-leg)

- One session of 4 sets of 8 reps
- Next session of 4 sets of 10-30 rep
- 2 secs up / 3 secs down

Phase 2: Isotonics:

Exercise 3: Weighted Sled Pushes

- One session of 4 sets of 8 reps
- Next session of 4 sets of 10-30 rep
- 2 secs up / 3 secs down

Phase 2: Isotonics:

Exercise 3: Weighted Sled Pushes

- Keep ankle *super* stiff
- Don't let heel touch ground
- Move slowly

Phase 2: Isotonics:

Exercise 4: Stair Walks / Runs

- "End of phase 2" exercise
- Quickly up, slower down
- Keep heels high (minimal DF) going up and down stairs
- Increase speed as prep for Phase 3 & 4!

Phase 2: Isotonics

Rules:

- Can mix/match these exercises in a single workout
- Do each exercise 2-3 x per week
- 1-2 different exercises per session

They are *ready for Phase 3* once they meet the following standards:

- Pain should be "low and stable"
- 30-35 single leg calf raises with perfect technique
- 1x BW standing 1-leg heel raise (4 sets of 8 reps)
- 75% BW seated 1-leg heel raise (4 sets of 8 reps)
- 4-6 reps of 1-1.5x bodyweight 1-leg leg press

Phase 3: Energy Storage

- Stepping stone to full plyometric activity
- Building a tolerance for energy storage (i.e., landing)
- Minimize ground contact time (stiff ankle!)

Phase 3: Energy Storage

- Goal = NOT to maximize height or distance
- Goal = to gradually expose tendon to the demands of landing

Phase 3: Energy Storage

- Done every other day
- Pay attention to pain DURING and at 24-hours AFTER the training session (3-4 out of 10 *or less!)*

Phase 3: Energy Storage

Exercise 1: Double Leg *VERY LOW* Hops In Place (non-continuous)

Exercise 2: Double Leg *VERY LOW* Hops In Place (continuous)

* start with 3 sets of 30 secs for each exercise *

Phase 3: Energy Storage

Exercise 3: Jumping Rope

- Start with 2-leg jumping
- Start with 3 sets of 30 secs
- If pain worsens, do less the next session!

Phase 3: Energy Storage

Exercise 4: Jumping Rope

- Progress to 1-leg alternating jumping
- Start with 3 sets of 30 secs
- "Shadow skip" if they can't use rope well
- Great exercises for running prep

Phase 3: Energy Storage

Exercise 5: Sprint a few steps, then stop on 1-leg

- Good drill for "change of direction" athletes
- Progress to running at different angles and to different sides

Phase 3: Energy Storage

Exercise 6: *Non-Continuous* 2-Leg Hopping over Barriers

- Gather yourself between each jump
- Great intro into Phase 4!

Phase 3 exercises can blend into Phase 4 exercises by progressing the following variables:

- Performing continuous reps (i.e., single hop vs continuous hopping)
- Increasing the height of the plyometric
- Adding new planes of loading (i.e., lateral hops)
- Adding alternating/single leg movements

Phase 3: Energy Storage

- Only change ONE variable at a time!
- Monitor pain during and 24-hours after (3 out of 10 or less!)

Phase 4: Energy Storage & Release

- Includes exercises where the athlete jumps, lands & runs with maximal speed and/or intensity
- 2-leg and 1-leg exercises
- Important to expose the achilles to a wide variety of stimuli!

Phase 4: Energy Storage & Release

Exercise 1: 2-Leg Bunny Hops Forward

- Keep ankles stiff
- Quick ground contact time!
- 3 sets of 15-30 seconds

Phase 4: Energy Storage & Release

Exercise 2: 2-Leg Bunny Hops Side-to-Side & Forward

- Bounce side-to-side as you hop forward
- Quick ground contact time!
- 3 sets of 15-30 seconds

Phase 4: Energy Storage & Release

Exercise 3: Single Leg Bunny Hops Forward

- Keep ankles stiff
- Quick ground contact time!
- 3 sets of 15-30 seconds

Phase 4: Energy Storage & Release

Exercise 4: 1-Leg Bunny Hops Side-to-Side & Forward

- Bounce side-to-side as you hop forward
- Quick ground contact time!
- 3 sets of 15-30 seconds

Phase 4: Energy Storage & Release

Exercise 5: Skipping for Maximal HEIGHT

- 3 sets of 15-30 seconds
- Drive knee toward the sky

Phase 4: Energy Storage & Release

Exercise 6: Skipping for Maximal DISTANCE Forward

- 3 sets of 15-30 seconds
- Drive knee forward

Phase 4: Energy Storage & Release

Exercise 7: Change of Direction Sprinting

- End stage exercise
- Before athlete can return to play
- Progress to sport specific drills

Progress Indicators

- Pain less than 3/10
- NO morning stiffness or pain more than a 3/10
- Able to maintain good form

Monitoring Tools

- Daily pain scores
- Morning stiffness
- Exercise capacity
- Weekly VISA-A

What is the VISA-A?

- Victorian Institute of Sport Assessment-Achilles
- User friendly
- 8 questions about pain, functional status and activity

VISA-A

- Max score = 100 (asymptomatic person)
- Lower score = *more* symptoms!
- Average achilles patient will score less than a 70/100.

VISA-A QUESTIONNAIRE

PHYSIOTUTORS

Patient Name: _____

Date: _____

Instructions: In this questionnaire, the term "pain" refers specifically to pain in the achilles tendon region

1. For how many minutes do you have stiffness in the Achilles region on first getting up?

100 minutes ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 0 minutes

2. Once you are warmed up for the day, do you have pain when stretching the Achilles tendon fully over the edge of a step? (keeping knee straight)

Strong severe pain ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 No pain

3. After walking on flat ground for 30 minutes, do you have pain within the next 2 hours? (If unable to walk on flat ground for 30 minutes because of pain, score 0 for this question).

Strong severe pain ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 No pain

4. Do you have pain walking downstairs with a normal gait cycle?

Strong severe pain ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 No pain

5. Do you have pain during or immediately after doing 10 (single leg) heel raises from a flat surface?

Strong severe pain ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 No pain

6. How many single leg hops can you do without pain?

0 ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 10

7. Are you currently undertaking sport or other physical activity?

0	Not at all
4	Modified training ± modified competition
7	Full training ± competition but not at same level as when symptoms began
10	Competing at the same or higher level as when symptoms began

8. Please complete EITHER A, B or C in this question.

- If you have **no pain while undertaking Achilles tendon loading sports** please complete **Q8a only**.
- If you have **pain while undertaking Achilles tendon loading sports but it does not stop you from completing the activity,** please complete **Q8b only**.
- If you have **pain that stops you from completing Achilles tendon loading sports,** please complete **Q8c only.**

A. If you have no pain while undertaking Achilles tendon loading sports, for how long can you train/practise?

NIL	1-10 minutes	11-20 minutes	21-30 minutes	>30 minutes
0	7	14	21	30

B. If you have some pain while undertaking Achilles tendon loading sport, but it does not stop you from completing your training/practice for how long can you train/practise?

NIL	1-10 minutes	11-20 minutes	21-30 minutes	>30 minutes
0	4	10	14	20

C. If you have pain that stops you from completing your training/practice in Achilles tendon loading sport, for how long can you train/practise?

NIL	1-10 minutes	11-20 minutes	21-30 minutes	>30 minutes
0	2	5	7	10

TOTAL SCORE (_____ /100) = _____%

PHYSIOTUTORS

MORE INFORMATION

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Any Questions?

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