Achilles Tendon Repair Rehabilitation

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ORTHOPAEDIC AND THERAPY UPDATE

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Objectives

- Understand anatomy of the achilles tendon
- Recognize risk factors of the achilles tendon
- Determine appropriate rehabilitation interventions
- Explore recent research on return to activity following achilles tendon repair

Achilles Tendon

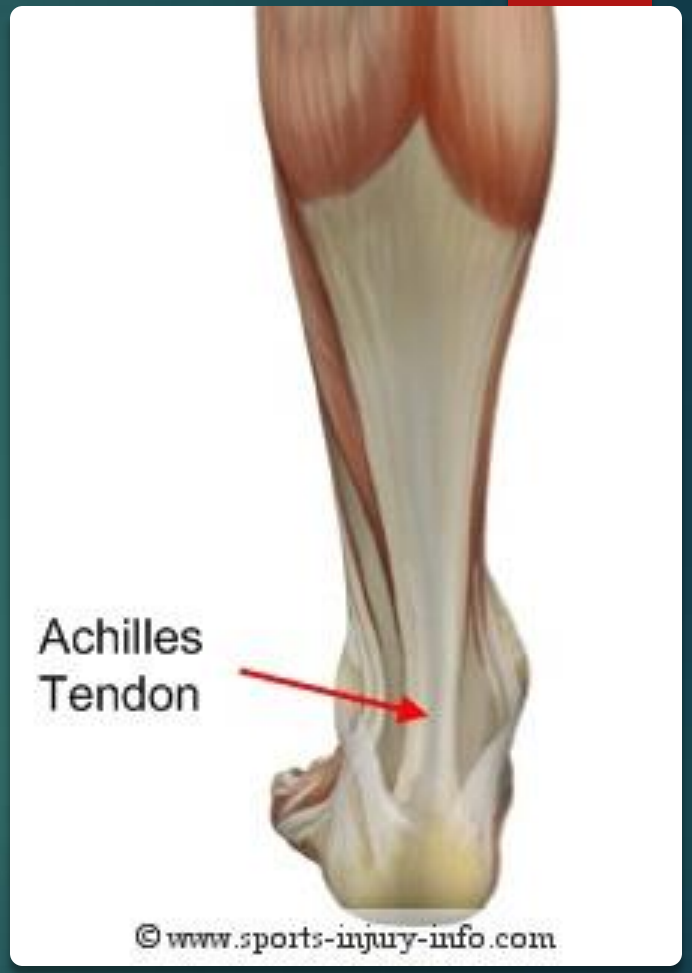
Largest and strongest tendon of the body

~ 15cm from musculotendinous junction to insertion into posterior calcaneal tuberosity.

Comprised of medial and lateral gastroc and soleus

As AT courses distally it rotates 90 degrees internally prior to insertion on posterior aspect of the calcaneous

Most commonly ruptured tendon in the human body

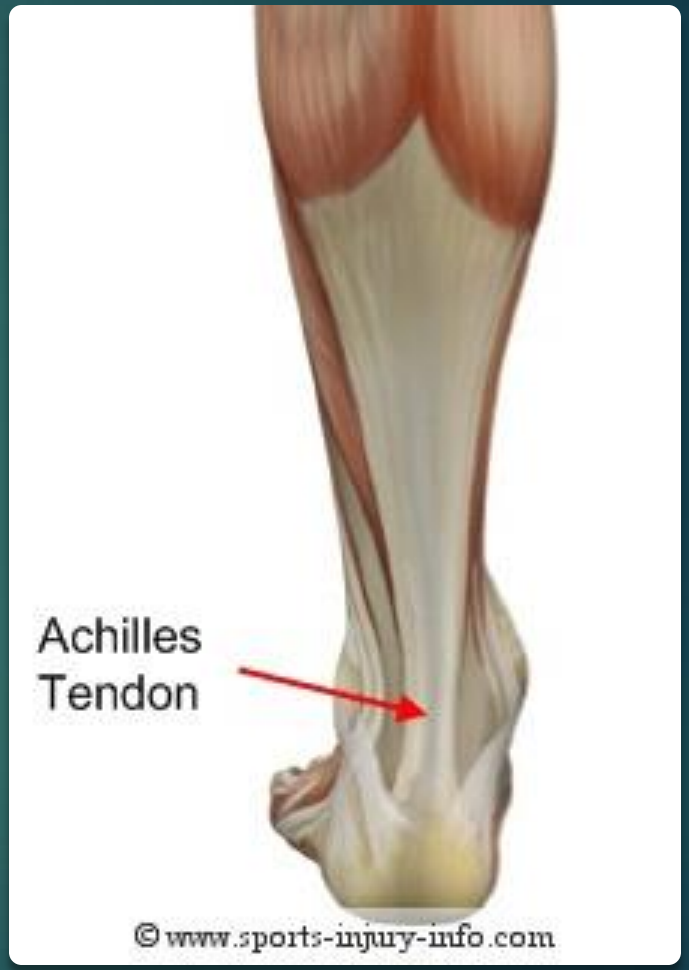


Anatomy

Proximally broad and flat descends to round in nature

Vascular density- greatest proximally least mid portion

Nerve supply – primarily from sural nerve, also smaller supply from tibial nerve



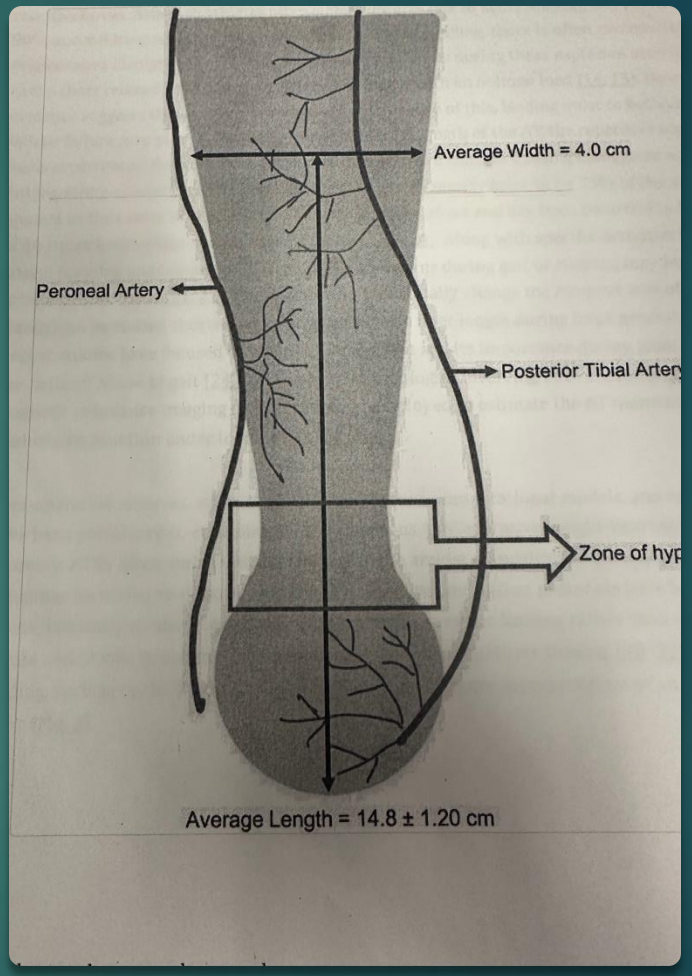
Anatomy

Blood supply comes from posterior tibial artery in proximal region and distal regions and peroneal artery mid-section

Watershed area-2-6cm from calcaneal insertion

Watershed area poorest blood supply

Watershed area where 75% of ruptures occur

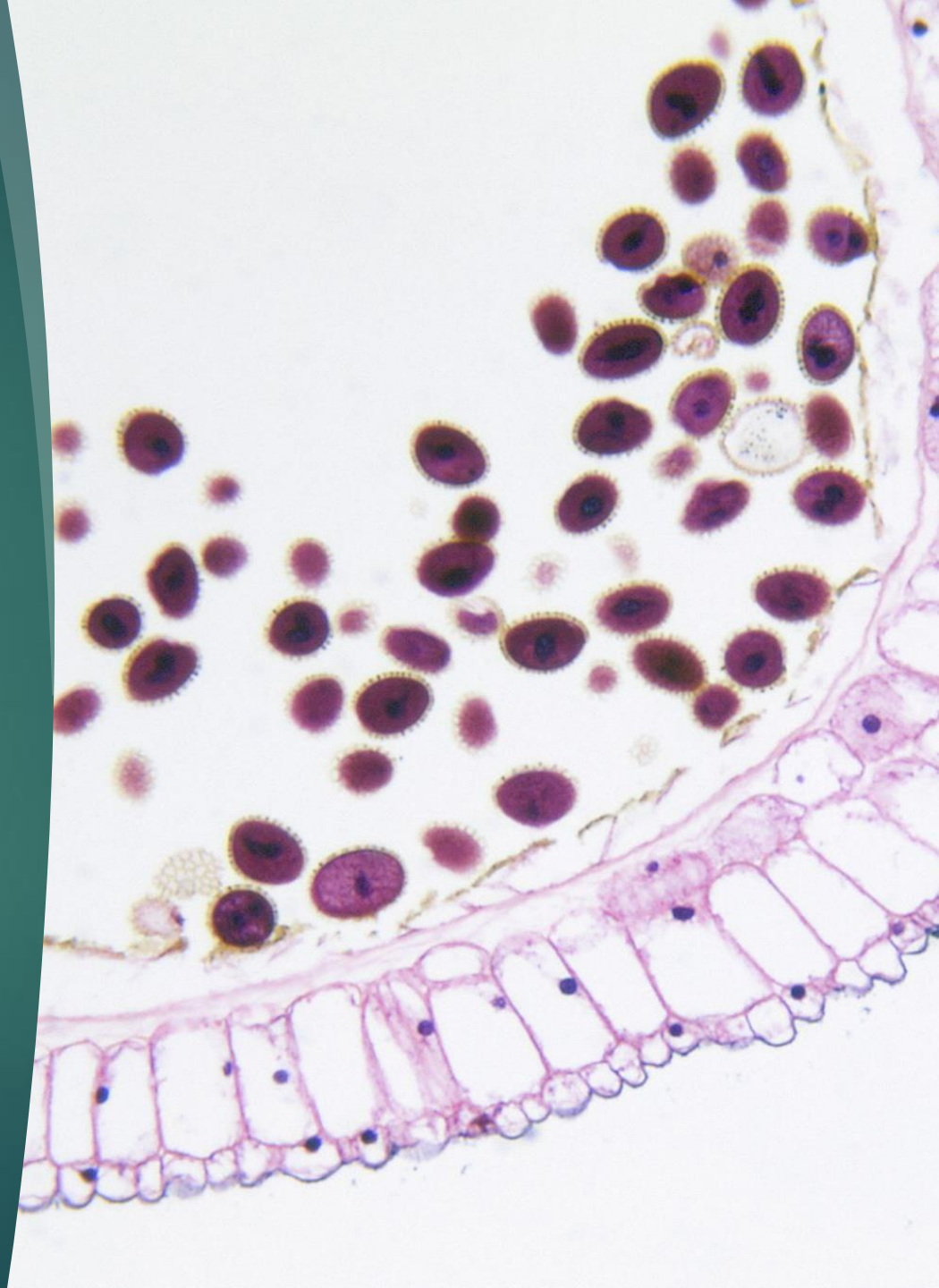


Anatomy

- Can be stretched up to 4% before damage
- Elastic properties can decrease with age
- AT in males found to have a larger cross-sectional area

Histological Properties of Achilles Tendon

- Lacks a synovial sheath
- Surrounded by single layer of paratenon
- Tenocytes within the paratenon produce collagen and allow for regeneration of type III collagen after injury



Risk factors affecting the Achilles tendon

- Intrinsic
  - Dorsiflexion ROM- Kaufman et. al. Am J Sports Med 2006
    - < 11.5 degrees of df with knee extended increased risk of at by factor of 3.5
  - Abnormal subtalar ROM- Kaufmann et al
    - Inversion rom > 32.5 degrees increased risk of at by factor of 28
  - Increased pronation- has whipping effect and may potentially decrease blood flow to the at

Risk Factors Continued

- Xergia et al 2022- Moderate evidence for decreased tendon fibril size
- Claessen et al 2014 - corticosteroids, Achilles Tendinopathy, DM in women only, renal failure, obesity, and spring season-temperature
- Hyperuricemia- Chen et al 2024 males only
  - Also found higher BMI, smoking and total cholesterol

Extrinsic risk factors

- Training errors – increased mileage
  - Increased intensity
  - Hill training
- Environmental factors
  temperature/season
- Faulty equipment

Achilles Tendon Rupture

Ages 30-50

Males much more likely than females

MOI usually rapid loading into df

L side > r side

Feeling of being kicked

FIGURE 1. Anatomy of the tendocalcaneal joint with a ruptured Achilles tendon

NBA Players with Achilles Ruptures

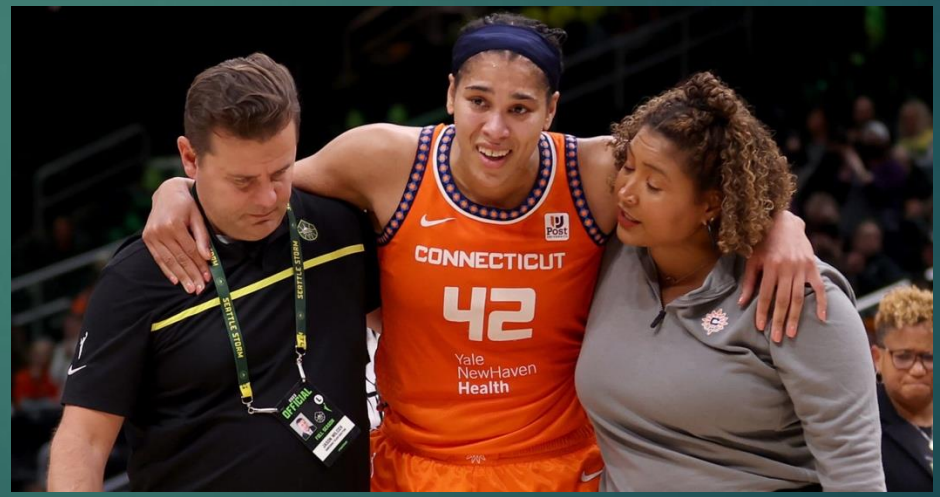
KD 2019

Kobe 2013

WNBA Players with Achilles Ruptures

Breanna Stewart 2019

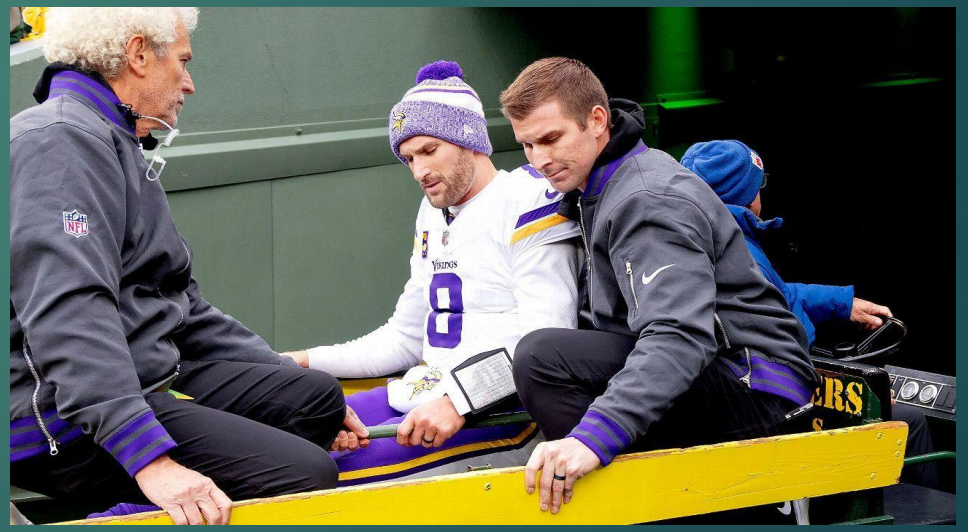
Brionna Jones 2023



NFL Players Achilles Ruptures

Aaron Rodgers 2023

Kirk Cousins 2023



MLS Players Achilles Ruptures

David Beckham 2010

Jack Price 2023

Additional Professional Athlete Achilles Rupture

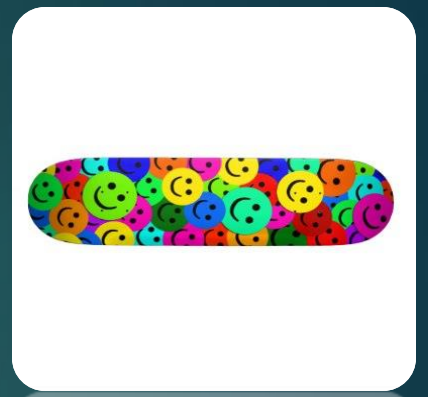
PGA Champions Tour Bernhard Langer 2024

Storm Hunter 2024

Surgical intervention

- Acute rupture
- Active lifestyle
- Within a few days of injury vs, delayed- He, Liao et al , 2022
- Immobilization varies per physician

Rehabilitation post surgery



- Begins usually 10-14 days post
- Splint to cam boot with ~ 1.5 inch wedge usually 1-2 weeks
- Passive PF active DF to 20 degrees PF
- Hip/ knee strengthening
- Submax iso's in boot facilitate venous return and

  stimulate gastroc activity in protected shortened position Marrone, et al. 2024

Rehabilitation post surgery

- Begin progressive weight bearing per md approval
- Achieve FWB in cam boot 6-8 weeks
- 8-10 weeks progress to normal shoe with ¼ inch lift until 12 weeks
- TB ex's @ 5-6 weeks
- Marrone avoid passive stretching of calf complex up to 12 weeks to protect repair from elongation

Rehabilitation post surgery

Bilateral heel raise ~ 8 weeks
Single leg heel raise ~ 14 weeks
Eccentric protocol ~ 16 weeks
Running ~ 20 weeks per md
Plyometrics ~ 24 weeks per md

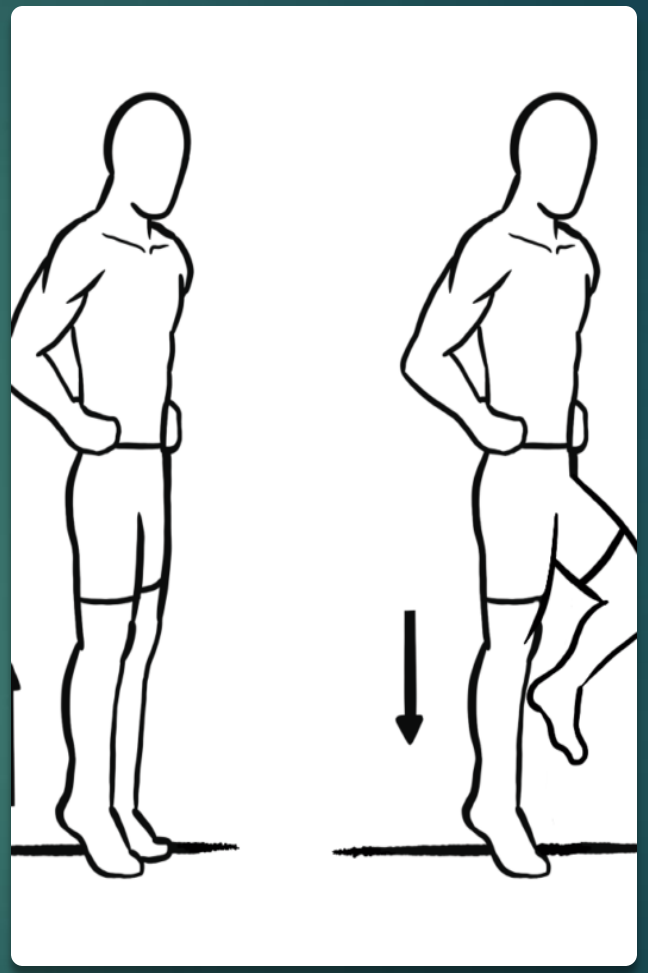
Return to Activity, Marrone, et al., 2024

Immediate phase (0-2 weeks) goal protect repair and wound healing

Controlled mobilization (2-6 weeks) goal progress WB to full in boot minimize pain and swelling

Early Rehab(6-12 weeks) goals normalize gait, restore strength and closed chain DF.

Late Rehab Phase (12-24 weeks) goals gradual and progressive loading, strength > 70-80% contralateral limb, running and initiate plyos



Return to Play Criteria
Marrone et. al., 2024

Avoiding DF past neutral until 8 weeks as greatest tendon elongation occurs btw 2-6 weeks post op regardless of WB protocol

Low load BFRT shown to increase AT morphological properties similar to high load resistance

Hansen et. al., 2024 Blood flow restriction

- Greater isokinetic strength in operative calf muscle at 3 months post op when using BFRT compared to control group.
- Initiated first 2 weeks w SLR, sidelying hip abd, LAQ.
- Emphasize BFR first 12 weeks of rehab.

Hodgens et. al., 2021 WNBA

Over 19 seasons 7 tears in 11,000 athletes

13 athletes returned for > 1 season, 4 did not

2 year follow up return to play was 58.8% compared to ACL return at 79%

Achilles tendon rupture have the lowest RTP percentage in professional women's basketball players when compared to other orthopaedic surgeries

Chauhan et. al., 2021 NBA study

- 1996-2017
- 25 players, returned 20, DNR 5,
- Mean recovery 311+/- 100 days
- 2.99 injuries/1000 hours
- Follow up 2 years offensively contributed 1.4 fewer points per game and 2.4 fewer wins.

Summary

Reviewed Achilles tendon anatomy and histology.

Discussed Rehab process following AT repair.

Explored recent return to play studies.

PEARLS

- Stretching ~ 8-12 weeks allow AT to “get tight”
- Make sure patients are aware of lengthy rehab process
- Don’t ignore hamstring strengthening
- Return to play/activity variable

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7. Kaufman et. al. Intrinsic risk factors for the development of achilles tendon overuse: a prospective study. Am J Sports Med. 2006.
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Thank you!!!!

Medora 2014

Colorado 2024