Ultrasound-Guided Percutaneous Tenotomies

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Ortho Nebraska

1

Disclosures

- I have NO financial disclosure or conflicts of interest with the presented material in this presentation.

2

About me...

- Kansas City University of Medicine & Biosciences (KCU)
- MercyOne Hospital – Family Medicine
- Texas Institute for Graduate Medical Education and Research (TIGMER)
- Special interests:
  - Sports & orthopedic injuries
  - Performing artists
  - Precision athletes
  - Concussions
  - Injury prevention

Kansas City University

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3

Learning Objectives

- Discuss indications for tenotomies
- Differentiate between dry needling and wet needling
- Review the procedure, benefits and rehabilitation guidelines

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4

Outline

- Tendinosis/Tendinopathy
- Pathophysiology
- What is percutaneous needle tenotomy?
- Advantages of PNT
- How is it performed?
- Post procedure rehabilitation
- Common indications vs. Contraindications
- Dry needling vs. Wet needling
- Patient outcomes
- Future considerations

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5

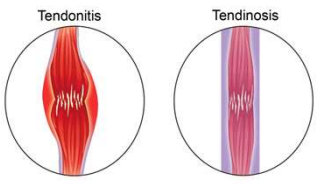
6

7

8

Tendinosis/Tendinopathy

- Chronic, degenerative condition (inflammation **NOT** a predominant feature)
- Presents as pain, decreased exercise tolerance, reduction in function – affected tendon less capable of sustaining tensile load
- Abnormal tendon unable to heal itself properly – "**failed healing response**"
- Secondary to excessive strain, overuse, microtrauma, etc.
- Predisposing factors: calcification, anatomic alignment, poor/inadequate mechanics, improper training, inadequate rest



9

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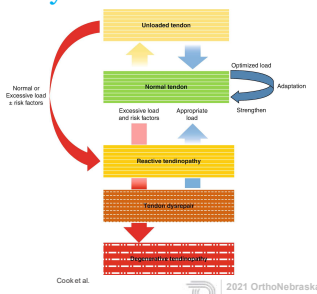

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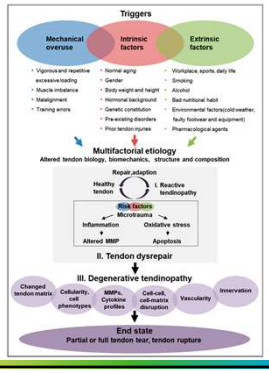
10



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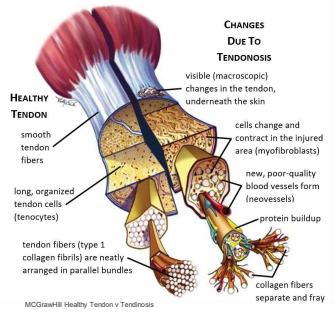

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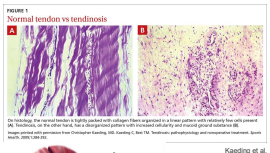
11

Tendinopathy Ultrasound Findings

- Neovascularization on ultrasound (blood flow not present in normal tendon with Doppler)
- Loss of fibrillar structure within the tendon
- Increased spacing of the hyperechoic fibrillar lines and reduced echogenicity
- Intratendinous calcifications
- Bone-tendon interface irregularity
- +/- Pain with sonopalpation



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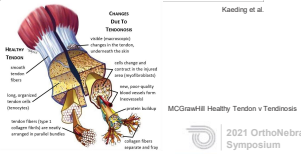

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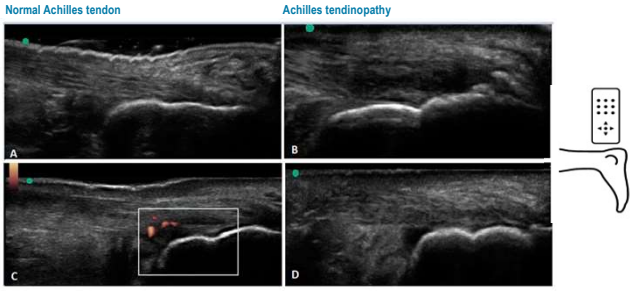
12



13

What is tenotomy?

- Orthopedic – surgical cutting of a tendon
- **Primary care/Sports medicine** – percutaneous needle tenotomy; use of a needle to make small holes in a tendon through the skin; fenestration of an affected tendon to break up scar tissue and cause bleeding within a tendon to prompt an inflammatory response
- Physical therapy – trigger point dry needling; use of a thin filiform needle to release or inactivate myofascial trigger points to relieve pain or improve ROM

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14

Percutaneous Needle Tenotomy (PNT)

- Minimally invasive procedure able to be performed in office
- Under direct ultrasound-guidance & sterile conditions
- Small needle is introduced through the skin (18-22G)
- Needle is passed through a damaged tendon multiple times (15-30 passes)
- Purpose is to create an enhanced healing response resulting in tendon repair

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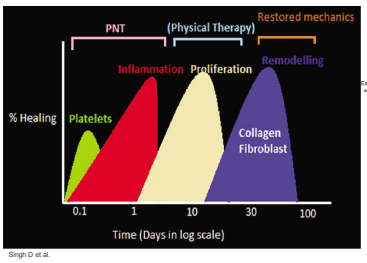
15

Percutaneous Needle Tenotomy (PNT)



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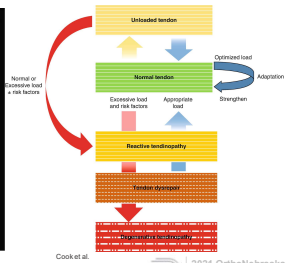

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16

Post Procedure Care

- Immediate:
  - Avoid NSAID's x2wks before and after procedure
  - Avoid ice (to not inhibit induced inflammation)
  - Necessary precautions for weightbearing tendons (Achilles tendon, patellar tendon)
- Promote motion early
- Physical therapy ~2-3wks post procedure
  - Gradual eccentric load program
- Clinic follow-up at 2wks and 6wks post procedure

17

Advantages & Benefits of PNT

- Minimally invasive
- Efficacious
- In-office procedure (some specialized tenotomy equipment requires operating room)
- Cost effective
- Quicker return to activity/sport

18

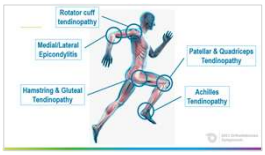
Dry Needling vs. Wet Needling

- Dry needling: needle alone (tendon fenestration only)
  - Some specialized equipment to fenestrate, debride, irrigate and aspirate continuously
- Wet needling: needle with injection (tendon fenestration plus…)
  - Corticosteroid (?efficacy short-lived) – tendinosis is a **non-inflammatory** condition; underlying tendon abnormality not directly treated with peritendinous injections
  - Prolotherapy (hyper osmolar dextrose causes local inflammation and may act as a vascular sclerosing agent)
  - Autologous blood (autologous platelets within the whole blood will increase concentration of growth factors and promote healing)
  - Platelet rich plasma ($$$)
- Simply placing the needle into the tendon may be the primary reason that the tendon improves?
  - Repeated passes of the needle through the tendinosis → disrupts chronic degenerative process → bleeding & inflammation → locally increases growth factors and promotes healing

19

Indications for PNT

- Symptoms refractory to conservative management – physical therapy, proper training & conditioning, adequate rest, analgesics & rehabilitation
- Lateral & Medial epicondylitis
- Patellar tendinopathy
- Rotator cuff tendinopathy
- Hamstring tendinopathy
- Gluteal tendinopathy*
- Achilles' tendinopathy



20

Contraindications

- Bleeding disorders
- Anticoagulation
- Presence of a local infection
- Prior steroid injection < 3mo ago
- Presence of underlying tendon tear? – risk of tendon rupture as a complication increases with the degree of preexisting tendon tear
  - High-grade tear may not benefit from tendon fenestration – consider autologous blood vs. PRP?
  - Consider tenotomy with tendinosis, interstitial tearing, or partial-thickness tearing <50% of tendon involvement
  - Avoid fenestration if tendon thickness tearing >50%

21

Patient Outcomes for PNT

- Lateral & Medial epicondylitis
- Patellar tendinopathy
- Rotator cuff tendinopathy
- Hamstring tendinopathy
- Gluteal tendinopathy
- Achilles' tendinopathy

22

Patient Outcomes for PNT

- **Lateral & Medial epicondylitis**
  - Statistically significant pain reduction 4wks post procedure and maintained 12wks after
  - Common extensor tendinosis with 80% improvement in symptoms
  - PRP vs. fenestration alone (n=230) – no difference at 12wks but with decreased pain scores with the PRP group at 24wks
- Patellar tendinopathy
- Rotator cuff tendinopathy
- Hamstring tendinopathy
- Gluteal tendinopathy
- Achilles' tendinopathy

23

Patient Outcomes for PNT

- Lateral & Medial epicondylitis
- **Patellar tendinopathy**
  - 2013 – 24 tendon studies (76% improvement vs. 24% no change at 4wks post procedure)
  - PRP vs. fenestration alone (PRP better at 12wks but no significant difference at 26wks)
- Rotator cuff tendinopathy
- Hamstring tendinopathy
- Gluteal tendinopathy
- Achilles' tendinopathy

24

Patient Outcomes for PNT

- Lateral & Medial epicondylitis
- Patellar tendinopathy
- Rotator cuff tendinopathy
- **Hamstring tendinopathy**
- **Gluteal tendinopathy**
  - 2015 – 22 tendons studied (gluteus medius/minimus, hamstring, tensor fascia lata); reported marked or some improvement 82%
  - 2016 – gluteus medius/minimus randomized controlled study (n=30), PRP vs. fenestration alone, significant improvement at 1-2wks (early improvement with pain and function), approximately 80% with long-term improvement (1yr), no difference between treatment groups at 1yr
- Achilles' tendinopathy

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25

Patient Outcomes for PNT

- Lateral & Medial epicondylitis
- Patellar tendinopathy
- Rotator cuff tendinopathy
- Hamstring tendinopathy
- Gluteal tendinopathy
- **Achilles' tendinopathy**
  - No significant difference at 24wks and 1yr comparing PRP vs. saline (both with fenestration)
  - Both groups showed improvement with eccentric physical therapy

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26

Future Considerations

- Does tendon fenestration alone produce similar results compared with tendon injections?
- Does increased vascularity, echogenicity, or size of tendon abnormality on ultrasound influence results?
- Variability considering tendon vs. tendon response?
- Patient variables: Age? Smoking history?
- Chronicity of symptoms?
- Prior treatments?
- Tendinosis vs. partial tearing?
- Timing of physical therapy?
- Technique differences? – needle choice, number of needle passes
- Sonographic follow-up

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27

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28

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Questions?

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29