Innovative Treatment Options for In-Season and Out of Season Recalcitrant Tendinopathy

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Disclosures

• Sonosite
  – Educational Speaker

• Tenex
  – Minor investor

• McGraw-Hill
  – Book Royalties
Outline

• Tendinopathy theories
• Review of PRP outcome study
  – PRP will be discussed more in Tennis Medicine session.
• Pitfalls of PRP
• Neovessels and their potential role in painful, chronic tendinopathies

• Alternative Procedures to PRP injections
  – High Volume Image Guided Injection (HVIGI)
  – US-guided scraping
  – FAST Procedure for Tendinopathy
Why are we here?
Degenerative Tendon Model

- Failure of tendon to progress through healing cascade
  - Stuck in proliferative phase
  - “Inside” the tendon

- Treatments
  - Physical therapy - Eccentric strengthening
  - Nitric Oxide patches
  - Percutaneous needle tenotony (PNT)
  - Platelet Rich Plasma, Prolotherapy, Bone Marrow Aspirate, Fat Graft
  - US guided percutaneous procedures (Tenex/ FAST)
  - Surgical debridement
Neurogenic Inflammation Model

- Pain and structural abnormalities mediated by neonerves in association with neovessels and/or other pain sources at fat/tendon interface
  - “Outside” the tendon
- Treatments
  - Physical therapy - Eccentric strengthening
  - Nitric Oxide patches
  - Polidocanol Sclerosing Injections
  - High volume Image Guided Injections (HVIGI)
  - US/mini open procedures (Scraping)
  - ? US guided percutaneous procedures (Tenex/ FAST)
325 patients with isolated tendinopathy sent questionnaire
- Eliminated all non tendons and regional PRP treatment
- 180 responded (55%)

All retrospective data analyzed with following questions
- Overall improvement
  - Not at all, slightly, moderately, mostly, completely
- VAS score – pre and post
- Overall satisfaction
- Nirchl phase scale
82% reported moderate to complete improvement
- 50%- 100% relief of symptoms
70 % reported mostly to complete improvement
-- 75-100% relief of symptoms
> 50% Improvement
Why are we still debating if orthobiologics works?

- Need to define what we are injecting?
  - Platelet counts
    - MSC counts
    - Leukocyte +/ -
      - Differential
  - RBC +/ RBC –
  - Autologous/ Allogenic

- Need to define the procedure
  - US guidance
  - Needle tenotomy?

- Rehabilitation methods
  - Immobilization ?
  - Timing of eccentrics

- Do different body regions require different formulas?
If WBC are present (+) the % of neutrophils should also be reported.

The method of exogenous activation should be reported.

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<table>
<thead>
<tr>
<th>Criteria</th>
<th>P Volume Injected</th>
<th>M Concentration/ uL</th>
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<tbody>
<tr>
<td><strong>P</strong> Platelet count</td>
<td>&gt;1%</td>
<td>+</td>
</tr>
<tr>
<td><strong>L</strong> Leukocyte Concentration</td>
<td>&lt;1%</td>
<td>-</td>
</tr>
<tr>
<td><strong>R</strong> Red Blood Cell Concentration</td>
<td>&gt; 1%</td>
<td>+</td>
</tr>
<tr>
<td><strong>A</strong> Activation</td>
<td>Yes</td>
<td>+</td>
</tr>
</tbody>
</table>

Final Score

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1 If WBC are present (+) the % of neutrophils should also be reported.

2 The method of exogenous activation should be reported.
Pitfalls of PRP for Tendinopathy

- Our PRP data suggests less success with patella tendon
- Literature suggests mid-portion achilles tendon may not respond better than placebo (de Vos et al)
- Increased pain post-procedure
- Cost to patient
- Time it takes to get better
  - What to do with in season athlete?
Dr. Hakan Alfredson
Alfredson’s research on patella and mid-portion achilles tendinopathy

- Neovessels and nerves that run with neovessels are possible pain generators in tendinosis
- Neovessels come from deep portion of the tendon and are invested with the fat pad
- Eccentric exercises work for chronic tendinosis
  - Mechanism may be by mechanical disruption of neovessels
Alfredson’s research on patella and mid-portion achilles tendinopathy

- NEVER go inside of tendon for procedure
- Sclerosing neovessels OUTSIDE OF TENDON with polidocinol works about 80% of the time and the tendon regenerates when imaged 12-24 months later
- Scraping procedure
  - By scraping the posterior tendon away from the fat pad with a mini-operation, he noted higher success rate (90%) and FASTER RTP (than sclerosing injections)
  - Also performed an US guided arm to study
Ultrasound and Doppler-guided mini-surgery to treat midportion Achilles tendinosis: results of a large material and a randomised study comparing two scraping techniques

Håkan Alfredson

BJSM, Feb, 2011

• 125 mid-portion achilles tendon
• 88 treated with mini-open procedure
• 37 were put in RCT
  – Mini-open scraping tx
  – US-guided percutaneous tx
• Evaluated VAS during loading
• Overall satisfaction
Ultrasound and Doppler-guided mini-surgery to treat midportion Achilles tendinosis: results of a large material and a randomised study comparing two scraping techniques

Håkan Alfredson

BJSM, Feb, 2011

• Results
  – Non- Randomized (88)
    • 89% had good clinical outcome
      – VAS 77 to 2
  – Randomized (37)- No statistical difference
    • Mini- open group
      – 89% with good clinical outcomes
        » VAS- 69 to 6
    • US- guided percutaneous tx
      – 74% good clinical outcomes
        » VAS 74 to 2

• RTP was 4-6 weeks in most patients with good clinical outcome
High Volume Image Guided Injection (HVIGI)

• British clinicians have been exploring an injection to dissect the painful fat pad of mid-portion Achilles and proximal patella tendinosis

• Modern day protocol started around 2000 in London:
  – 40cc of .9% NACL
  – 10 cc of marcaine
  – 25mg of Hydrocortisone
    • To counter mechanical inflammatory affect from high volume injection
    • No long-acting or particulate steroids used
HVIGI

- Maffulli et al originally believed results are from mechanical disruption of neovessels/neonerves at fat pad/tendon interface – Other pain generator? – What you inject not as important as volume of injectate – If pain reduced, allows for ability to load tendon normally
  - Stress Shielding/ Mechanotransduction

*Neovascularization in Achilles tendinopathy: have we been chasing a red herring?*

Johannes L. Tol, Filippo Spiezia & Nicola Maffulli

High volume image guided injections for the management of chronic tendinopathy of the main body of the Achilles tendon

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High-Volume Image-Guided Injection for Recalcitrant Patellar Tendinopathy in Athletes

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Sarah Morton1
Otto Chan2
Jessica Price1
Melanie Pritchard2
Tom Crisp1,2
John D. Perry1,2
Dylan Morrissey1,2,3

Original article

High volume image-guided injections and structured rehabilitation improve greater trochanter pain syndrome in the short and medium term: a combined retrospective and prospective case series
US guided scraping procedure

High Volume Ultrasound Guided Scraping (HVUGS)

High Volume Image Guided Injection (HVIGI)
Find the right patient?
Find the right patient ?
Normal Achilles tendon with ankle DF/PF

Achilles tendinosis with ankle DF/PF with fat pad adherence to tendon
Procedure

• **Needles:**
  – 25g 1.5in for lidocaine
  – 18-22g 1.5in needle for procedure

• **Injectate**
  – 5 cc lidocaine 1%
    • Create skin wheel
    • Anesthetize under tendon with US guidance
      – Fat pad rich in nociceptors
  – 20-60 cc syringe with NS
    • 18-20 gauge needle
    • 1-2cc lidocaine 1% per 10cc solution
    • Original protocol calls for 50cc
Procedure

• Alternatives injectates
  – Substitute HA for some/all of NS
  – Use as adjunct to PRP
    • Use PPP as injectate
  – Add 10% dextrose to solution
    • “Neuralprolotherapy”, “neural therapy”
    • May use for achillodynia
Post procedure

• Immediate:
  – Look at US for reduction in neovessels
  – ?? Walking boot ??

• Sub-acute:
  – Slowly return to activities between 2-14 days
    • Let pain/ symptoms be your guide
    • If use corticosteroids, would wait at least 7 days
  – Successful cases will often have relief within a week
    • Often within 48 hours
Achilles Tendon
HVUGS
Achilles Tendon
HVUGS
Personal Experience/ Pearls

• Still figuring out:
  – Patient
    • Look at fat pad dynamically on US
  – Volume of medicine
  – Combination of Meds
    • Marcaine/ Lidocaine
    • Hyaluronic Acid
    • Dextrose
    • No Corticosteroids
  – How much rest after procedure?
  – Do we need to repeat procedure?
  – When to offer procedure?
    – First line treatment, with PRP, or for failed PRP?
Thank You
Take Home Points

• Treatment of recalcitrant tendinopathy should be specific to the pathophysiology of the tendon
  – PRP does not heal everything and has pitfalls
• HVIGI and US-guided scraping procedure has good outcomes is small studies
  – Good success (? better) in combined procedures
    • HVUGS (High Volume Ultrasound Guided Scraping)
• FAST procedure has potential as another option for recalcitrant tendinopathy
• New treatments are ever-evolving and expanding so let’s continue our search for optimal patient outcomes