Tendinosis Treatment: from PT to PRP

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MSK injuries

1. Traumatic Injury
   - result from specific episode of trauma (contusion, fracture, strain)

2. Overuse Injury
   - account for more than 50% of injuries seen in sports medicine practices
   - microscopic injury (microtrauma) from repeated activity (overuse)
     → cumulative over time → can result in inflammation early on (tendinitis)
     → degeneration later on (tendinosis)

Normal

Tendinitis: inflammation of the tendon

Tendinosis: degeneration of the tendon with no inflammatory markers
Clinical Presentation and Progression

Overuse with microtrauma, no pain

- pain after activity
- pain during activity

- chronic unremitting pain even at rest
Initial Treatment of Tendinitis/ositis

- Rest-Compliance
- Brace - Reduce Load
- ICE
- NSAID
- Iontophoresis: inconsistent results in studies
PT: Eccentric Strengthening

- Eccentric strengthening: lengthening tendon while contracting it.
- Most effective strengthening in tendinopathy
- Strongest EBM supporting it
- Duration: 6-12 weeks
Treatment Options for Persistent Pain

• **Cortisone injection** (+/- fenestration)
  - Provide pain relief short term, but effectiveness long term has not been demonstrated.

• Nitroglycerin patches
  - Current data support the use; larger trials needed to confirm early results.

• Verapamil Cream
  - Cost
Treatment Options for Persistent Pain

• ART, ASTYM or Graston
• U/S guided dry needling of the tendon
• Shock Wave Therapy: inconsistent results. Not using
• Sclerotherapy: studies support its use
• Acupuncture: limited evidence
• PRP: preliminary work is promising, but further studies required
• Surgical Debridement: remains the last option due to the morbidity and inconsistent outcomes.
ART

- Over-used muscles and other soft tissues get injured from overuse with the accumulation of small tears (micro-trauma) and not getting enough oxygen (hypoxia).
- Each of these factors can cause your body to produce tough, dense scar tissue in the affected area.

- The ART provider uses his or her hands to evaluate the texture, tightness and movement of muscles, fascia, tendons, ligaments and nerves.
- Abnormal tissues are treated by combining precisely directed tension with very specific patient movements - over 500 specific moves.
Graston Technique

- The Graston Technique: instrument-assisted soft tissue mobilization that enables therapist to effectively detect and treat scar tissue and restrictions that affect normal function.
- The Technique Separates and breaks down collagen cross-links, and splays and stretches connective tissue and muscle fibers.
- Increases the rate and amount of blood flow to and from the area.

ASTYM
Results Reported

• **ART**: Dr. Leahy was able to consistently resolve over 90% of his patients' problems.

• **Graston:**

![Success Rate Table]

The Success Rate is based on attainment of an overall outcome, rated from good to complete, against those predetermined goals. The primary means of evaluating the success rate is based on decrease in pain and increase in function. Overall effectiveness is related to the common conditions listed below:

<table>
<thead>
<tr>
<th>Injury</th>
<th>Average # of Treatments</th>
<th>Complete 100%</th>
<th>Excellent 90%+</th>
<th>Good 80%+</th>
<th>Fair 70%+</th>
<th>Unchanged less than 70%</th>
<th>Success Rate</th>
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* = Median # of treatments

Success Rate: Percentage of Resolution equates to attaining the patient/clinician goals of:
1) increase in function
2) decrease in pain.
Sclerotherapy

- Injecting a sclerosing agent (polidocanol) into the areas of neovascularization resulting in sclerosis of the vessels.
- May also eradicate the pain-generating nerve fibers that travel in close proximity to these areas of neovascularization.
- These injections are performed under Doppler ultrasound guidance to locate areas of neovascularization and to guide injection.
- This theory has been tested in a series of clinical trials evaluating the treatment of tennis elbow, patellar tendonitis, and Achilles tendinitis.
- This tendinosis treatment method showed promising results in small pilot studies.
Shock Wave Therapy

- Most accepted one is that the microtrauma of the repeated shock wave to the affected area creates neo-vascularization. New blood flow promotes tissue healing.
- A number of both favorable and unfavorable studies exist, some utilizing deficient research practices.
- Presently this technology is approved in the US by FDA for treatment of only plantar fasciitis and tennis elbow.
- Now it can be done without anesthesia in the physician's office in less than 10 minutes.
US guided dry needling

- 55 patients with chronic elbow tendinosis for more than 6 months had significant improvement on long term follow up (McShane 2006)
- 38 patients with patellar tendinosis showed improvement (Testav et al 1999)
Platelet Rich Plasma (PRP) Injections

- An established technique in which PRP is injected into the damaged tendon to try to stimulate a healing reaction to heal the tendon, improving its function and decreasing pain.
- Natural healing reaction:
  - Injury occurs → platelets become activated and gather at the injury site.
  - Platelets release growth factors (GF).
  - GF stimulate tissue repair by triggering the healing cascade.

**PDGF**
(Platelet derived growth factor)
Cell growth, new generation and repair of blood vessels, collagen production

Platelets release various growth factors

**FGF** (Fibroblast growth factor)
Tissue repair, cell growth, collagen production, hyaluronic acid production

**VEGF**
Growth and new generation of vascular endothelial cells

**TGF-β**
Growth and neogenesis of epithelial cells and vascular endothelial cells, promotion of wound healing

**EGF** (Epithelial growth factor)
Promotion of epithelial cell growth, angiogenesis, promotion of wound healing
PRP procedure

- Patient’s blood is drawn by phlebotomist in my clinic.
- Blood is centrifuged for 15 minutes.
- Platelet rich plasma (highly concentrated) is extracted into a syringe.
- I inject the PRP (3 or 6cc) into the damaged tendon under ultrasound guidance.
Procedure
Post PRP rehabilitation

- Avoid NSAID use for at least 2 weeks prior to procedure (4 weeks without cortisone) and 4 weeks after procedure.
- Initially there may be a bruise and localized pain.
- Stretching for 1-2 weeks.
- Return to isometric then eccentric strengthening exercises.
- 4 weeks may return to regular activities.
- 6-8 weeks return to higher level activities.
- Most people feel improvement after one PRP Tx.
- There is no limit to the amounts of treatments you can have but I limit it to two treatments (spaced out about 6 weeks).
PRP studies

Improvements in different types of tendinosis
- 51 subjects with chronic tendinosis treated with U/S guided needle tenotomy and PRP injection.
  - 76% improvement in pain and 70% in function outcomes.
  - 83% at 14 months satisfied with outcomes. 84% had tendon improvement under U/S.
  (Finnoff et al. AmAcad of PMR 2011)

Improvements in recalcitrant elbow tendinosis
- 15/15 cases improved at 8 weeks and 6 months (Mishra et al 2007)
- 100 pts with lateral epicondylitis in the Netherlands. PRP and Cortisone groups
  - 73% PRP successful (VAS and DASH scores) vs. 49% in cortisone group.
  - PRP progressively improved. Cortisone group was better initially and then declined
  (Peerbooms AJSM 2010)

Improvement in chronic patellar tendinosis
- 7/8 patients. 91% improvement at 4 months. Improved tendon (Volpi et al)

Improvements in Rotator Cuff Tendinosis
- 60 RC surgery repairs, 50% PRP after surgery under anesthesia.
  - After 3 months no apparent differences. (Dr. Weber)
PRP studies

Improvement in chronic achilles tendinosis
• 12 pts post surgery for achilles tear, earlier recovery for PRP patients (AJSM 2007)
• PRP no better than saline injections in achilles tendinosis (JAMA 2010)
• 28/30 achilles tendinosis patients follow up to 6 months satisfied with clinical results (Dr. Monto)
• Silva et al, unpublished

Improvement in plantar fasciitis
• 36 patients with plantar fasciitis resistant to traditional Tx.
  Depo Medrol vs cortisone groups
  Avg post Tx AOFAS scores at 3 months, 6 months and 12 months
  PRP: 95→94→94  vs.  Cortisone: 81→74→58  (Dr. Monto)
PRP

• What we know: PRP is very safe.
  - Injections can be performed in tendons and ligaments all over the body.
  - Not much risk to patients except their pocketbooks.

• Pro-inflammatory non-surgical options have promising results but further studies needed to determine if effective
PRP indications

• This treatment option can be considered in any patient with:
  chronic (>6 months) joint pain due to suspected tendinosis despite conservative treatment (PRICE, NSAID, PT/OT, other Tx modalities).

• Most common tendons injected: elbow, patellar achilles, and plantar fascia

• Other tendons: Rotator cuff and quadriceps

• Strongest evidence of PRP effectiveness is in the injection for chronic lateral and medial epicondylitis.
PRP coverage

• Some insurance companies won’t cover it because they still consider the treatment to be experimental.

• Network Health Insurance covers the procedure

• The out of pocket charge if insurance doesn’t cover it is $600, which is much less than what other places (UW-Madison and MCW) charge

• CPT code 0232T. Including harvesting and preparation as well as image guidance and injection

• Not FDA approved
PRP for Osteoarthritis

- It also has been used to try and decrease pain and improve function in Osteoarthritis on many patients and has been proven safe.
- Intrarticular PRP injection influences cartilage regeneration in all severities of rabbit knee OA (Anna Rehabil Med 2012)
- 150 Italian patients with knee OA, PRP vs HA. PRP showed more and longer efficacy than HA injections in reducing pain and symptoms and recovering articular functions. Better results with less severe OA (2011 Arthroscopy Journal. Dr. Kon)
- Fifteen patients underwent one PRP injection. 73% improved pain, stiffness and function. 73% no MRI progression after 1 year (2013 AJSM Hospital for Special Surgery).
- 14 patients knee OA. PRP times 3 at 4 wk intervals. Significant and linear improvements in knee injury and OA outcome scores including pain relief. Most patients expressed favorable outcome 12 months after Tx. No adverse events. (AJof PMR Sampson et al 2010)
PRP other indications

Acute muscle injuries
• Dr. Kimberly Harmon: plasma based product-leukocyte poor PRP with lower plt count since most import GF is IGF-1 not found in platelets. Three week hamstring strain may become a 2 weeks hamstring strain.
• One study of 10 FB player PRP showed no advantages over routine rehab in RTP time.

Diabetic foot ulcers
• Effective to speed healing in diabetic foot ulcers. Case study, and 2010 study with 14 patients, 86% good response
Conclusions

• The ideal treatment for tendinopathy remains unclear.
• Numerous available treatment options with questionable efficacies
• You have to look at the studies but you have to take into account what you are seeing clinically.