PRP- What is the Evidence, Risks, and Benefits

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Platelet-Rich Plasma

- Autologous venous blood
- Centrifuged
- Concentrated platelet sample
- Platelets degranulate:
  - Alpha granules: contain 95% of growth factors
  - Secrete additional growth factors (7 days)
  - Bind to cell membrane receptors: healing


Tendon: healing

- Inflammatory phase
  - First week after injury
  - Fibrin clot
  - Cell migration, neovascularity
- Proliferation phase
  - 1 to 4 weeks
  - Fibroblasts synthesize collagen and extracellular proteins
- Remodeling phase

Galloway MT et al. JBUJS 2013; 95:1620

PRP: safety

- Pain: up to several days
- Risks:
  - Infection: PRP has antibacterial effects
  - Tumor:
    - Insulin-like growth factor (IGF) linked to cancer
    - IGF is not elevated in PRP preparations


PRP: injections

- Tendon
- Muscle
- Ligament
- Osteoarthritis
- Cartilage

Post-procedure:

- Patellar tendon:
  - Knee brace (locked) x 2 weeks
  - First week non-weight bearing with crutches
- Achilles tendon:
  - Walking boot x 2 weeks
- Follow-up: referring physician + physical therapy

Galloway MT et al. JBUJS 2013; 95:1620
Common Extensor Tendon: PRP

- 22-gauge needle
- In plane with transducer and long axis to tendon
- Fenestrate during PRP injection
- Most common: one treatment

Common Extensor Tendon

- PRP vs fenestration: 230 subjects
  - 24 weeks: PRP higher success (84% vs 68%)
- PRP, fenestration, steroid (in tendon):
  - No significant difference
- PRP vs whole blood: no difference

Common Extensor Tendon

- PRP vs steroid (+fenestration)
  - PRP significantly better at 2 years
- PRP is superior to steroids
- PRP is equal to lidocaine
  - Martin GI, J Ortho Surg Res 2019; 23:14
- Meta-analysis: inconclusive

PRP and Tendon Injection

- Gluteal Tendons: greater trochanter
  - Randomized controlled: 30 patients
  - PRP versus fenestration alone
  - Significant improvement at weeks 1 and 2
  - Approximately 80% had long term improvement: up to 1 year follow-up
  - No difference between treatment groups
  - Two injections: more sustained response

PRP and Tendon Injection

- Gluteal Tendons: greater trochanter
  - Randomized controlled: 80 patients
  - PRP versus steroid injection
  - Ultrasound-guided: 5 – 6 needle passes
  - Patients with > 4 months of symptoms had greater clinical improvement with PRP at 12 weeks

PRP: proximal patellar tendon

Pre-procedure  PRP injection

PRP and Tendon Injection

- Patellar tendon
  - Randomized controlled: 23 patients
  - PRP + fenestration versus fenestration alone
  - PRP better at 12 weeks, no different at 26 weeks
  - PRP no better than saline


PRP and Tendon Injection

- Achilles tendon
  - Randomized controlled: 54 patients
  - PRP versus saline injection
  - No significant difference at 24 weeks and 1 year

1de Vos RJ et al. JAMA 2010; 303:145
3Zhang YJ. Clin Orthop Relat Res 2018; 39:1623

- Metaanalysis
  - PRP + eccentric physical therapy compared with saline
  - No difference in outcomes: clinical or ultrasound findings

1Hurley ET et al. Arthroscopy 2019; 35:1584

PRP and Tendon Injection

- Rotator cuff
  - PRP not beneficial

- Supraspinatus
  - Interstitial tear
  - No difference between PRP and saline

PRP and Plantar Fascia Injection

- Plantar fascia
  - PRP versus corticosteroid (40 patients)
  - PRP more effective and durable

Monto et al. Foot Ank Int 2014; 35:313

PRP and Muscle Injection

- Proximal hamstring
- PRP versus rehabilitation only
- Randomized controlled: 28 patients
- PRP group: full recovery earlier
  - 27 days versus 42 days (average)

PRP and Muscle Injection

- Hamstring
- PRP versus rehabilitation alone
- 10 National Football League players
- Median time: return to play
  - PRP = 20 days vs. rehabilitation = 17 days
  - No significant difference between groups


PRP and Muscle Injection

- Gastrocnemius: rat model
- PRP versus saline injection: 46 rats
- Followed to 14 days
- Outcome: strength and histologic analysis
- No significant difference between groups


PRP and Ligament Injection

- Ulnar collateral ligament: elbow
  - Partial tear on MRI
  - 34 athletes followed for 70 weeks
  - 88% returned to play, average 12 weeks
  - Joint space widening:
    - Decreased from 28 to 20 mm
    - Change in width: 7 to 2.5 mm


PRP and Cartilage

- Meta-analysis: 21 papers
- Increased chondrocyte and mesenchymal stem cell proliferation
- Proteoglycan and Type II collagen deposition
- Increase chondrocyte viability
- Migration of stem cells
- Hyaline vs. fibrocartilage?


PRP and Knee Osteoarthritis

- PRP may be slightly better than hyaluronic acid
- Benefits may decrease after 1 year
- Mild OA responds better
- No anatomic information
- Leukocyte-poor preparation is best
- Cartilage did not increase in thickness

Wang D. et al. JBJS Reviews 2017; 5:1

Labrum: PRP

- Platelet-rich plasma injection
- Inject into labral tear (yellow arrow)
- Efficacy unknown

White arrowheads = needle
PRP and Meniscus

- 15 patients
- US-guided PRP injection
- Meniscal degeneration
- 67% had functional improvement
- Grade 2 degeneration improved to Grade 1

Ozyalvac ON. et al. J Ortho Surg 2019; 28:1

PRP: issues

- Different PRP systems
  - Variable platelet concentrations
  - Leukocyte poor versus rich
- Studies:
  - Variable controls, often unblinded
  - Often not compared to other treatments
  - Variable follow-up time points
  - How many injections?
  - Acute versus chronic conditions?
  - Which tendon?

PRP: where are we today?

- Promotes healing, does not cause harm
- Need: randomized controlled trials
- Meta-analysis:
  - No conclusive evidence to support PRP use over other treatments
  - Supports use for knee osteoarthritis
- Accuracy? What about cost effectiveness

1 Sheth U. et al. JBJS 2012; 94:268
2 Wang D. et al. JBJS Reviews 2017; 5:1

Syllabus on line and other educational material: www.jacobsonmskus.com

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