PRP: What Is It Good For?

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- Not relevant to this talk

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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


Platelets: growth factors

- PDGF: platelet-derived growth factor
- VEGF: vascular endothelial growth factor
- TGF: transforming growth factor b-1
- IGF: insulin-like growth factor
- EGF: epidermal growth factor
- FGF: fibroblast growth factor
- TNF: tumor necrosis factor
- WTF: what’s that factor?

Platelet-Rich Plasma: uses

- Historically:
  - Used in maxilla-fascial surgery: 1990’s
- Other surgeries:
  - Fracture, non-union, bone fusion
- Cosmetics:
  - Alopecia, scars, wrinkles
- Tendon and ligament injuries
- Osteoarthritis


PRP: what’s in the mix

- Platelet count:
  - 500K ideal (in vitro)¹
  - Tenocyte proliferation, migration, collagen type 1 production
  - Less effectiveness if higher, even cell death
- White blood cells:
  - Leukocyte poor or rich concentrations
  - Poor: less catabolic cytokines, more healing²

  ²McCarrel TM et al. JBJS 2012; 94:e143
PRP: Arthrex
- One of many available systems
- Double syringe system
- Leukocyte poor
- No anticoagulant needed
- Venous draw: 15 ml
- Place directly in centrifuge: 5 min
- 2 - 5 ml PRP
- Platelet concentration: 200 – 500K

PRP: injections
- Tendon
- Muscle
- Ligament
- Osteoarthritis
- Cartilage

PRP and Tendon Injection
- **Common extensor tendon: elbow**
  - Randomized controlled: 230 patients
  - PRP + fenestration versus fenestration alone
  - No difference in outcomes at 12 weeks
  - Significant difference in pain scores at 24 weeks: PRP group had less pain


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 (72%) vs fenestration (56%)
  - Both improved
- 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**
- Metanalysis: 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


PRP and Tendon Injection

- Patellar tendon
  - Randomized controlled: 23 patients
  - PRP + fenestration versus fenestration alone
  - PRP outcomes better at 12 weeks
  - No significant difference in outcomes when greater than 26 weeks


PRP: proximal patellar tendon

Pre-procedure

PRP injection
PRP and Tendon Injection

• Achilles tendon
  – Randomized controlled: 54 patients
  – PRP versus saline injection
  – No significant difference in outcomes
    • At 24 weeks\(^1\)
    • At 1 year\(^2\)

\(^1\) de Vos RJ et al. JAMA 2010; 303:145

PRP and Tendon Injection

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

Monto et al. Foot Ankle 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

• 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 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 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 widening: 7 to 2.5 mm


PRP and Knee Osteoarthritis
- Several studies evaluating PRP and knee OA
- Most studies show superior results with leukocyte-poor PRP compared with saline or hyaluronic acid
- Mild OA responds better
- No anatomic information
- One study showed same results with 1 or 2 injections

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

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?

Smyth N. et al. Arthroscopy 2013

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

White arrowheads = needle

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
  - Supports ultrasound-guided leukocyte-rich PRP for tendinopathy
  - Supports use for knee osteoarthritis
- Accuracy? What about cost effectiveness

1Sheth U. et al. JBJS 2012; 94:298
2Fitzpatrick J. et al. AJSM 2017; 45:226
3Wang D. et al. JBJS Reviews 2017; 5:1
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