Scalpel or Stem Cells; PRP Facts vs. Fiction

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Disclosures

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- Valeant
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What is PRP?

- Typically Autologous blood is centrifuged

- Separates to
  - PPP
  - Buffy Coat
    - PRP + WBC’s
  - RBC’s
What is actually in each layer?

Actual PRP is only 5% of total volume

- **PLASMA** - 55% of Total Blood Volume
  - 91% Water
  - 7% Blood Proteins (fibrinogen, albumin, globulin)
  - 2% Nutrients (amino acids, sugars, lipids)
    - Hormones (erythropoietin, insulin, etc.)
    - Electrolytes (sodium, potassium, calcium, etc.)

- **CELLULAR COMPONENTS** - 45% of Total Blood Volume
  - **Buffy Coat**
    - White Blood Cells (7000-9000 per mm³ of blood)
    - Platelets (250,000 per mm³ of blood)
  - **Red Blood Cells (RBCs)**
    - About 5,000,000 per mm³ of blood
Case Study
Case Study
Case Study
How does PRP differ from debridement?

“Scalpel vs. Stem Cells”
• Debride the wound
• Get bleeding
• Stop bleeding
  • Platelets
• Platelets degranulate
  • Growth factors (PDGF)
    • Angiogenesis
    • Mitogenesis
    • Chemotaxis
• Debridement reduces contaminants and biofilms!
Concentration of WBC’s, Platelets containing growth factors, and fibrin

3-6 times WBC conc
Antimicrobial
- Attracts macrophages
- E. coli
- Staph aureus
- MRSA
- C. Albicans

<table>
<thead>
<tr>
<th>Growth Factors</th>
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<tbody>
<tr>
<td>PDGF</td>
<td>TGF-B</td>
</tr>
<tr>
<td>PF4</td>
<td>IL-1</td>
</tr>
<tr>
<td>VEGF</td>
<td>EGF</td>
</tr>
<tr>
<td>IGF</td>
<td>Fibronectin</td>
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</table>
What do you get with PRP

- Growth factors modulate mesenchymal cell recruitment, cell proliferation, ECM synthesis
- Leucocytes prevent infection
- Interleukins limit inflammation
- Fibrin

*Concentrations may vary depending on system used.*
  - 3-6x normal concentration of each
• Effective platelet count is 1 Million/µL (Marx, 2004)
  • Normal concentration is 200,000/µL

• Thrombin or Ca added to activate platelets and release growth factors
  • Also freeze, sonicate

• Question is whether or not this highly concentrated material is truly more beneficial than local debridement.

- 9 RCT’s
  - VLU’s and DFU’s

- Concluded that there was no scientific evidence to support the use of PRP due to high risk of bias and inadequate power.

- Very strict criteria eliminates otherwise impressive outcomes.
“Analysis of efficacy was performed on data from a total of eight trials. The results of the meta-analyses showed no difference in the rate of wounds completely healed when comparing autologous PRP with either standard care, with or without placebo, by ulcer aetiology and by the procedure used to obtain autologous PRP.”
So why do we chose PRP?
Antibiosis?

- Chen (2012) J. Diabetes Research
- APG (Autologous Platelet-rich Gel), along with PRP, PPP
- APG effective against Staph aureus, but not E. coli or Strep aerug
- Only 16 in vitro samples
Functions with PAD?

  - PRP on patients with PAD
  - PAD groups were staged
    - University of Texas/Fontaine Classification
      - Group A: I, IIa, IIb
      - Group B: III, IV
  - n=72 (32 with critical limb ischemia)
  - Retrospective study
### Extent of PAD matters!

<table>
<thead>
<tr>
<th></th>
<th>Ulcer Area Reduction &gt;50%</th>
<th>Ulcer Area Reduction &gt;90%</th>
<th>Any Amputation</th>
<th>Limb Salvage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A (n = 42)</strong></td>
<td>36 (86%)</td>
<td>35 (83%)</td>
<td>6 (14%)</td>
<td>42 (100%)</td>
</tr>
<tr>
<td><strong>Group B (n = 30)</strong> (CLI)</td>
<td>22 (73%)</td>
<td>17 (56%)</td>
<td>8 (27%)</td>
<td>22 (73%)</td>
</tr>
<tr>
<td><strong>Statistical significance</strong></td>
<td>$P = .23$</td>
<td>$P = .02$</td>
<td>$P = .23$</td>
<td>$P &lt; .001$</td>
</tr>
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</table>
Is PRP better than debridement?

- Compared PPP to PRP for clinical outcomes with DFU’s
- n=24
  - 12 randomized to PPP, 12 to PRP
  - 1º end point: Time to closure
  - Wounds were comparable in size, complexity, comorbidity
  - ANOVA analysis demonstrated statistically significant difference

- Mean closure time with PRP was 11.5 weeks (n=12)
- Mean closure time with PPP was 17.1 weeks (n=9)
Scalpel vs. Stem Cells??

*Bleeding and reduction of biofilms helps*

So…

*Either way, debridement is going to happen!*

*Consider vascular intervention prior to treatment.*
Closing Remarks / Thank You
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