WHEN SHOULD WE DELAY SURGERY WITH BIOLOGIC INJECTIONS?

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An Interactive Case-based approach

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Disclosures

- Neither I, R. Amadeus Mason, MD, nor any immediate family members, have no relevant financial or nonfinancial relationship(s) within the products or services described, reviewed, evaluated or compared in this presentation

Objectives

- Define Biologic injections
  - Understand the different options

- Discuss Rationale for use

- Discuss Use for MSK Pathology
  - What's in the literature

What are Biologic Injections?

What are Biologic Injections?

- The use of injectable ***biological substances*** to help ***MSK tissue*** heal.
  - Biological substances
    - ❖Naturally occurring in the body
    - ❖Normally associated with healing
  - MSK tissue
    - ❖Muscle
    - ❖Tendon
    - ❖Ligament

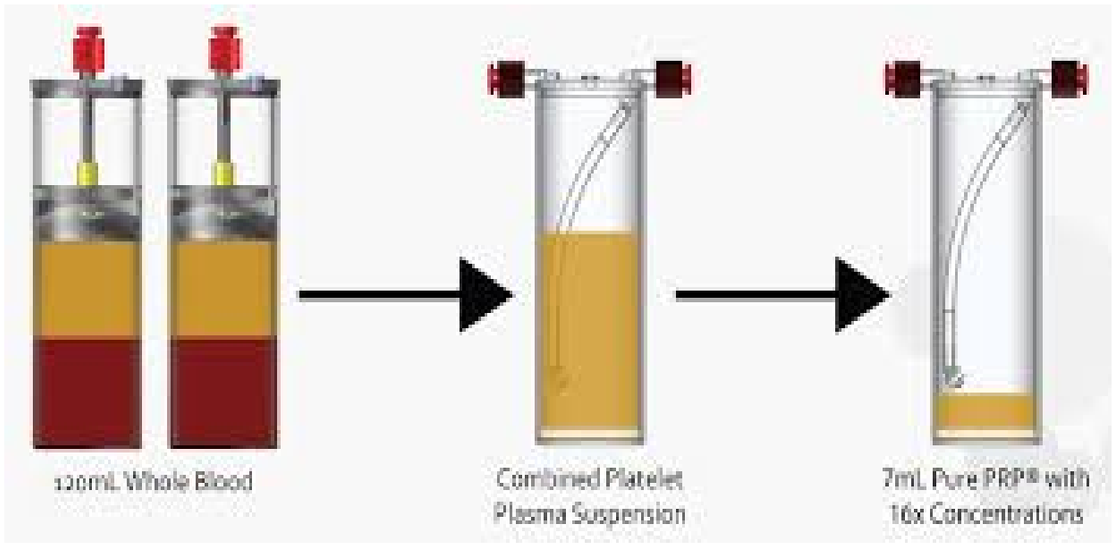
What are Biologic Injections?

- Include
  - Platelet Rich Plasma (PRP)
  - Stem cells
    - ❖Mesenchymal vs Embryonic
    - ❖Bone Marrow vs Adipose
  - Amniotic/ Chorionic allografts
    - ❖Frozen vs dehydrated
    - ❖HA vs growth factors

Platelet Rich Plasma

Platelet Rich Plasma (PRP)

- Autologous Blood
- Concentrated above baseline
  - Must be 4-5 times baseline ($1.5 – 4.5 \times 10^5$ uL)
    - ❖CBC prior to injection
  - Use variable speed centrifuge
    - ❖Cell counts post centrifugation



Platelet Rich Plasma (PRP)

- Classification system *Mishra, et al CPB(2012)*
  - 4 types
  - Based on
    - ❖WBC's
    - ❖Platelet activation
    - ❖Platelet Concentration

	PRP Classification	
	White Blood Cells	Activated?
Type 1	Increased over Baseline	No
Type 2	Increased over Baseline	Yes
Type 3	Minimal or No WBCs	No
Type 4	Minimal or No WBCs	Yes
	A: > 5x Platelets B: < 5x Platelets	

Platelet Rich Plasma (PRP)

- Leukocyte rich vs Leukocyte poor *Dragoo, et al AJSM (2012)*
  - Decreased pain
  - Decreased inflammation
  - No increase infection
- Low RBC
  - Intra-articular administration *Braun, et al AJSM (2014)*
- Treatment
  - Tendon – leucocyte poor
  - Muscle – platelet POOR
  - Cartilage/bone – RBC poor Leucocyte rich

Stem Cells

Stem Cells

- Mesenchymal
  - Found in adults
    - ❖Bone marrow
      - Posterior iliac crest
        - US or Floro guided harvest
        - Local pain medication
    - ❖Adipose
      - Peri-umbilical
        - Quasi embryonic due to location?
      - Inner thigh

Stem Cells

- Bone Marrow vs Fat
  - Marrow
    - ❖fewer in number with age
  - Adipose
    - ❖ inactivated but greater numbers

- Differentiate into cartilage, tendon and bone
  - In *vitro* vs in *vivo*
  - Finite number due to one time aliquot
    - ❖Do not want cells to replicate on their own

Amniotic/Chorionic Allografts (ACA)

Amniotic/Chorionic Allografts (ACA)

- A human tissue allograft
  - Derived from Amniotic/Chorionic fluid/Placental tissue
    - ❖Donated by mothers
  - Potent biological scaffolds
    - ❖***decellularized*** human Extracellular Matrix (ECM)
  - Significant “regenerative” enzymes and growth factors
    - ❖Tissue repair
    - ❖Wound healing
    - ❖Improve surgical outcomes.

Amniotic/Chorionic Allografts

Amniotic fluid, functions *in utero*,

- Protect, cushion and lubricate.
- Hyaluronic acid (HA) is a key element of amniotic fluid
  - provides viscosity and lubrication *in utero*
    - Also in joint synovial fluid.

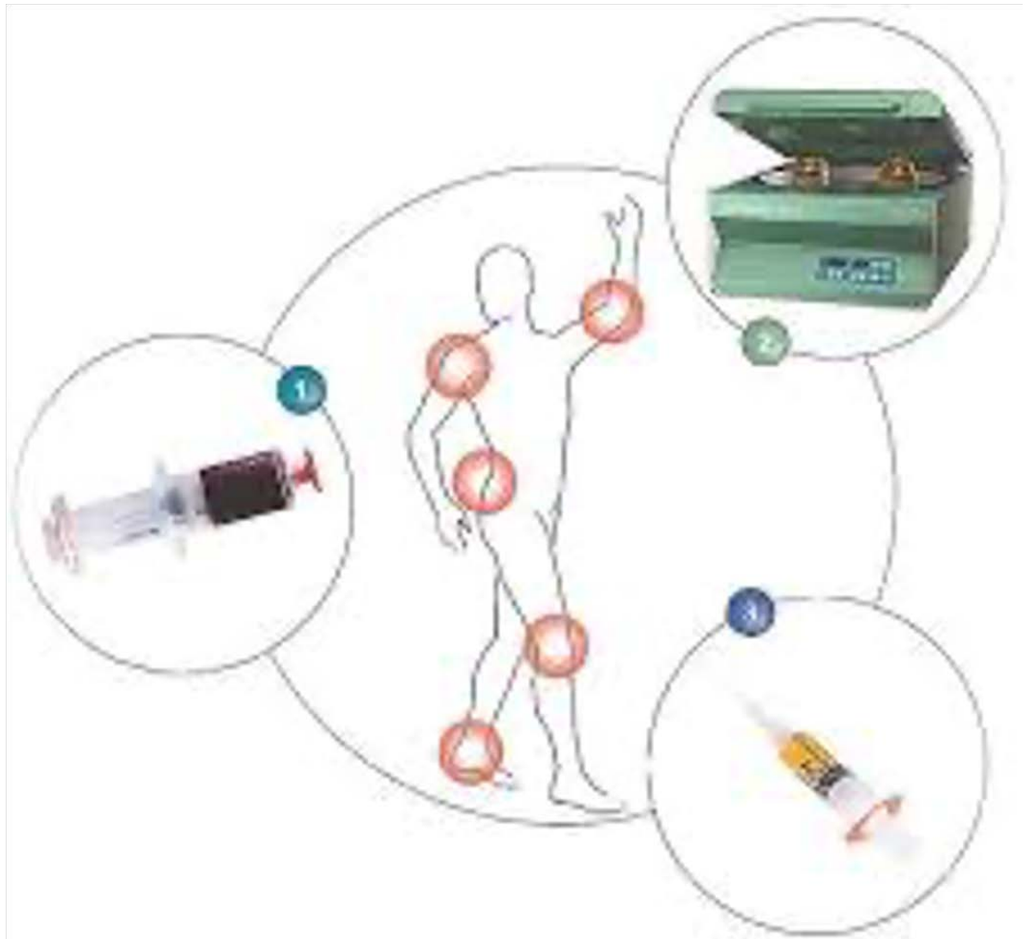
Lyophilized, (freeze dried)

- Intended for ***Homologous Use*** :
  - Protect & cushion
  - Provide lubrication for enhanced mobility
  - Modulate inflammation

Rational for Use

- Acute vs Chronic
  - Chronic usually more problematic
    - ❖Repeated Micro-traumatic events
    - ❖Disruption of the internal microstructure
      - Degeneration of the cell and matrix
  - Mismatch of injury and healing response
  - Augmented delivery of appropriate substance
    - ❖PRP/ACS – growth factors/Stem Cells
    - ❖MSC – Stem cells
    - ❖Amniotic products - growth factors only (NO Stem Cells present)

MSK applications



Lateral Epicondylitis

- Hastie G, at al. J Orthop. 2018
  - **METHODS:**
    - ❖ A retrospective review of cases from the 1/1/08 - 12/31/15.
    - ❖ The numbers of patients undergoing surgical release
    - ❖ The numbers of patients requiring PRP injections were recorded each year
    - ❖ The numbers of patients requiring surgery was compared pre and post PRP injection to ascertain if PRP introduction reduced surgical intervention.
  - **CONCLUSION:**
    - ❖ We consider PRP injection, for intractable lateral epicondylitis of the elbow, not only a safe but also very effective tool in reducing symptoms and have shown it has reduced the need for surgical intervention in this difficult cohort of patients.

Lateral Epicondylitis

Series vs single injection

- Base on severity
- MRI vs MSK US

Rehab protocol

- Immobilization
- Progressive strengthening
- Pain control

Achilles Tendinopathy

- Mautner K, at al. PM&R. 2013

  - **METHODS:**
    - ❖A Multicenter, Retrospective Review
    - ❖Four academic sports medicine centers from across the United States.
    - ❖A total of 180 men and women between the ages of 18 and 75 years.

  - **CONCLUSION:**
    - ❖The majority of patients (>50%) reported a moderate - significant improvement in pain symptoms.

Achilles Tendinopathy

Series vs Single injection

- Base on severity
- MRI vs MSK US

Rehab protocol

- Immobilization
- Progressive strengthening
  - Pain control

Sports Hernia

Make the diagnosis

- MSK US can be helpful
- MRI with “athletic pubalgia” protocol

“Single” injection

- Adductor insertion
- Rectus insertion
- Pubic symphisis?
- CSI

Formal rehab protocol

Rotator Cuff Tears

- Failed Conservative Treatment
  - Single injection
  - Rehabilitation Protocol
    - ❖Early mobilization
    - ❖Good pain control
  - Adipose Stem Cell?
    - ❖Full thickness tears (small)
    - ❖Provides scaffold

Take Home Points

When to consider Biologic injections

- With Chronic/overuse injuries.
- After failing conservative treatments.
- When there isn't a reliable surgical option.
- If the patient isn't a good surgical candidate.

This is not a panacea

- There should be sound rationale behind use.
- Beware of over hype.
  - "Amniotic stem cells".

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