HA vs PRP: Double-Blind RCT Comparing Clinical Outcomes and Intra-Articular Biology for Treatment of Knee Osteoarthritis

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Introduction

• Osteoarthritis (OA) is a debilitating disease that, in some form, affects up to 47 million Americans each year and is estimated to affect 67 million by 2030. Hyaluronic acid (HA) is currently utilized as an intra-articular injection for treatment of patients with knee OA.

• A movement in biochemical research has emerged that focuses on analysis of catabolic and anabolic growth factors of the joint. It is proposed that platelet-rich plasma (PRP) is a biologic alternative to HA that may alter the intra-articular biologic milieu to mitigate the symptoms of OA.
The purpose of this double-blind prospective randomized clinical trial is to compare the effects of PRP to HA for the treatment of OA in the knee using validated clinical outcome measures and biologic correlates associated with osteoarthritis.
Hypothesis

• We tested the null hypothesis that there are no differences in clinical outcomes as measured by validated clinical scoring systems for OA, nor is there any difference in intra-articular biology between groups of patients treated with HA and those treated with PRP over a 6-month time period.
Methods

Patients were enrolled based on the following:

- **Inclusion Criteria**
  - Ages 18-80
  - Diagnosis of knee OA with a minimum of 3 months of symptoms
  - Kellgren- Lawrence Grade 1-3 OA on plain radiographs

- **Exclusion Criteria**
  - Knee instability or major axial deviation (>5 degrees varus or valgus)
  - Bilateral symptomatic lesions or OA in other joints (eg back, hips)
  - Systemic disorders (eg diabetes, rheumatoid arthritis, infection)
  - History of anemia
  - Current use of anticoagulants or use of NSAIDs in 5 days prior to CBC
  - Intra-articular injection of HA or corticosteroids within last 30 days
Methods

• Patients were randomized to one of two cohorts: HA or PRP.

• Each received three weekly ultrasound-guided injections of HA or PRP (Figures 1-2). All patients underwent blood draws to maintain blinding.

• At the index treatment visit and at 6-, 12-, and 24-week follow-up, patients completed a survey and underwent clinical examination.

• Patients also underwent ultrasound-guided knee aspiration for synovial fluid analysis during each treatment visit and at 3-month and 6-month follow-up.

• Synovial fluid was grouped and analyzed via ELISA assay for catabolic factors TNF-a, IL-1B/IL-F2, IL-1ra/IL-1F3, IL-6, and CXCL8/IL-8.
Methods

Figure 1: Ultrasound-guided intra-articular knee injection of hyaluronic acid.

Figure 2: PRP preparation kit (left); prepared PRP after centrifugation (center); intra-articular knee injection (right).
Results

111 patients (mean age 56.2 ± 10.2 years; 53 male, 58 female) were enrolled; 11 patients (9.9%) were lost to follow-up or withdrew.

On all scales, outcomes improved significantly from the index visit at 6-months post-treatment (p<.01). PRP had higher IKDC (p<.02) and lower VAS pain scores at 6-month follow-up (p<.01) (Figure 3).

Lysholm and WOMAC trended towards greater improvement in the PRP group but did not demonstrate statistical significance.

The PRP cohort had significantly higher IL-6 concentration than HA at 6-month follow-up (p=.02) (Figure 4). There were no significant differences in concentrations of the other catabolic factors.
Results – Clinical Outcomes

Figure 3: PRP had higher IKDC (p<.02) and lower VAS pain scores at 6-month follow-up (p<.01) compared to HA.
Results – Biologic Outcomes

**Figure 4**: The PRP cohort had significantly higher IL-6 concentration than HA at 6-month follow-up (p=.02).
Discussion

- Intra-articular PRP and HA result in significant improvement of pain and function at 6 months for OA.

- PRP may be a superior treatment for the active patient with OA; the PRP cohort was found to have a statistically significant improvement in IKDC score as compared to HA, which is a scoring system that uses active participation in strenuous sport as its upper limit.

- Evaluation of intra-articular cytokines along with clinical data further suggests the nociceptive and anti-nociceptive properties of TNF-α and IL-6, respectively.
Thank You