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Disclosures:

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Medicine & Rehabilitation*

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DOI

ORIGINAL RESEARCH ARTICLE

Injection of Platelet-Rich Plasma in Patients with Primary and Secondary Knee Osteoarthritis

A Pilot Study

ABSTRACT

Sampson S, Reed M, Silvers H, Meng M, Mandelbaum B: Injection of platelet-rich plasma in patients with primary and secondary knee osteoarthritis: A pilot study. *Am J Phys Med Rehabil* 2010;89:961–969.

Objective: To evaluate the clinical effects of intraarticular platelet-rich plasma (PRP) injections in a small group of patients with primary and secondary osteoarthritis. Most of the current treatments for osteoarthritis are palliative and attack the symptoms rather than influencing the biochemical environment of the joint. Autologous platelet-rich plasma has emerged as a treatment option for tendinopathies and chronic wounds. In addition to release of growth factors, platelet-rich plasma also promotes concentrated anti-inflammatory signals including interleukin-1ra, which has been a focus of emerging treatments for osteoarthritis.

Design: In this single-center, uncontrolled, prospective preliminary study, 14 patients with primary and secondary knee osteoarthritis who met the study criteria received three platelet-rich plasma injections in the affected knee at ~4-wk intervals. Outcome measures included the Brittberg-Peterson Visual Pain (Visual Analog Scale [VAS]), Activities, and Expectations score and the Knee Injury and Osteoarthritis Outcome Scores at preinjection visit at 2-, 5-, 11-, 18-, and 52-wk follow-up visits. Musculoskeletal ultrasound was used to measure cartilage thickness.

Results: There were no adverse events reported. The study demonstrated significant and almost linear improvements in Knee Injury and Osteoarthritis Outcome Scores, including pain and symptom relief. Brittberg-Peterson VAS showed many improvements including reduced pain after knee movement and at rest. Cartilage assessment was limited because of the small sample size. The majority of the patients expressed a favorable outcome at 12 mos after treatment.

Conclusions: The positive trends and safety profile demonstrated could potentially be used to inspire a larger, blinded, and randomized clinical trial to determine whether platelet-rich plasma is safe and effective for the treatment of knee osteoarthritis.

Key Words: Platelet-Rich Plasma, Knee, Osteoarthritis, Injection

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TABLE 3 Ultrasound measured cartilage thickness

Cartilage Thickness in mm (n = 13)					
	Mean	Median	SD	SEM	P
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Pe	2.				
6 m	2.				
P	0.				0.2292
Cent a					
Pe	3.				
6 m	3.				
P	0.				0.4698
Med a					
Pe	2.				
6 m	2.				
P	0.				1.0000

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**Data Analysis
 Statistical Methods**

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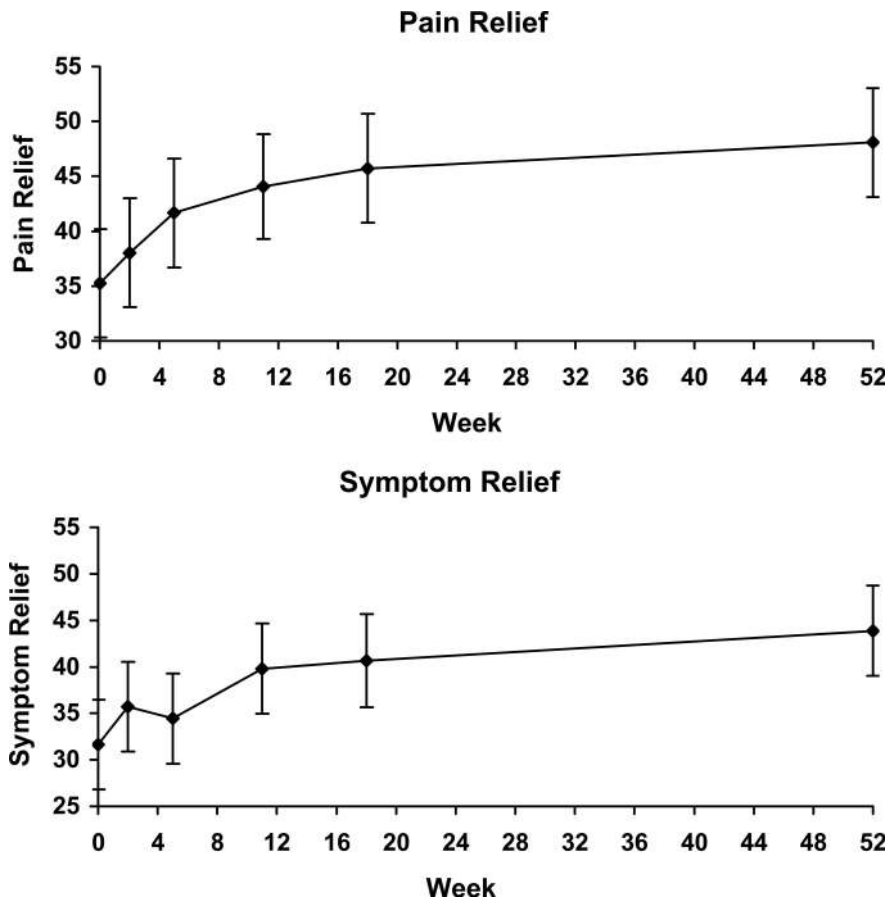


FIGURE 2 Knee Injury and Osteoarthritis Outcome Score results.

No significant differences were found at baseline. $P < 0.05$.
 OA severity was significantly greater.

at baseline and 25, 50, and 75 weeks.
 20. $P < 0.05$.
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RESULTS

For the OA severity score, the mean (SD) score was 18.7 (4.5) at baseline, 18.8 (4.5) at 4 weeks, 18.7 (4.5) at 12 weeks, 18.8 (4.5) at 18 weeks, and 18.7 (4.5) at 52 weeks. The mean (SD) score was 18.7 (4.5) at baseline, 18.8 (4.5) at 4 weeks, 18.7 (4.5) at 12 weeks, 18.8 (4.5) at 18 weeks, and 18.7 (4.5) at 52 weeks.

KOOS-
 OA severity score was significantly greater at baseline and 25, 50, and 75 weeks. The mean (SD) score was 25.0 (5.0) at baseline, 25.0 (5.0) at 4 weeks, 25.0 (5.0) at 12 weeks, 25.0 (5.0) at 18 weeks, and 25.0 (5.0) at 52 weeks. The mean (SD) score was 25.0 (5.0) at baseline, 25.0 (5.0) at 4 weeks, 25.0 (5.0) at 12 weeks, 25.0 (5.0) at 18 weeks, and 25.0 (5.0) at 52 weeks.

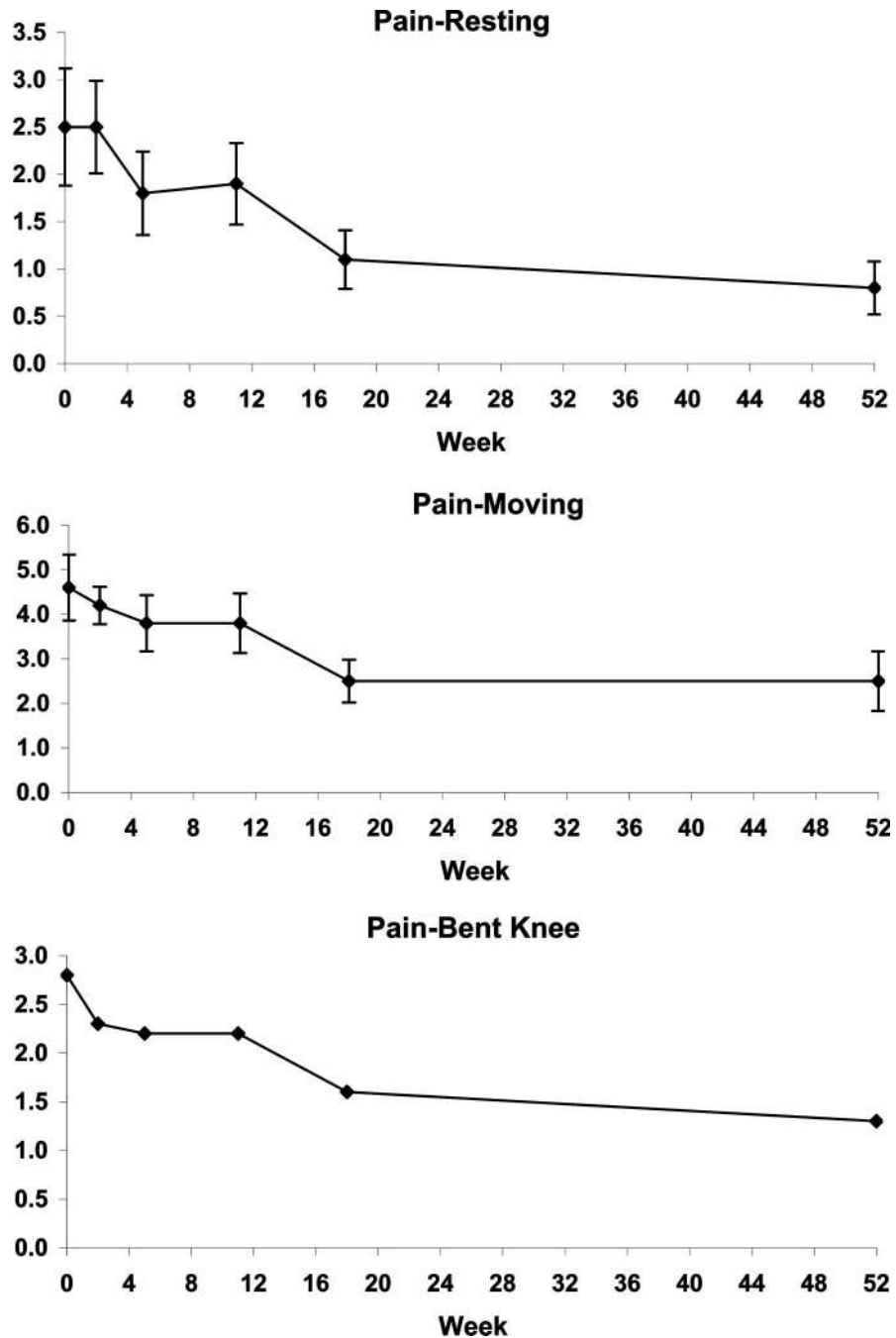


FIGURE 3 Brittberg-Peterson Pain VAS results.

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DISCUSSION

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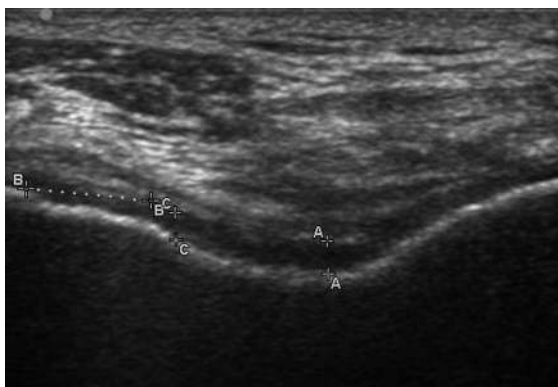


FIGURE 4 Knee cartilage measurement with ultrasound preinjection in an 87-yr-old man.



FIGURE 5 Knee cartilage measurement with ultrasound 6-mos postinjection in an 87-yr-old man.

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22. T e ef
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of *Int Orthop* 2007;
23. a d b n e a a t e d c e a g e e c b d t a f
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Scand* 2006;
24. d t n t e n e a e n e t of
n e . *Ann Rheum Dis* 2009;
25. *Practical Nonparametric Statistics*,
ed 2.
26. t c a n e d n e c o e n e t a n a
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Med* 2010;
28. t n t a t o g o b n k e a ;
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e t . *Implant Dent.* 2009;

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