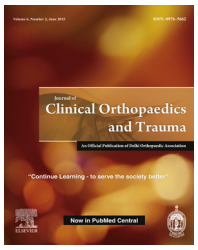
Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.elsevier.com/locate/jcot



Case report

Leukocyte-poor platelet-rich plasma to treat degenerative meniscal tear: A case report

J.P. Betancourt [a], W.D. Murrell [b,c,*]

[a] Department of Internal Medicine, University of Puerto Rico, San Juan, PR, USA
[b] Dr. Humeira Badsha Medical Center, Dubai, United Arab Emirates
[c] Orthopaedics, Rehabilitation, and Podiatry Department, Ft. Belvoir Community Hospital, Ft. Belvoir, VA, USA

ARTICLE INFO

Article history:
Received 14 April 2016
Received in revised form
1 May 2016
Accepted 5 May 2016
Available online xxx

Keywords:
Leukocyte-poor
Platelet-rich plasma
Meniscus
Knee
Osteoarthritis

ABSTRACT

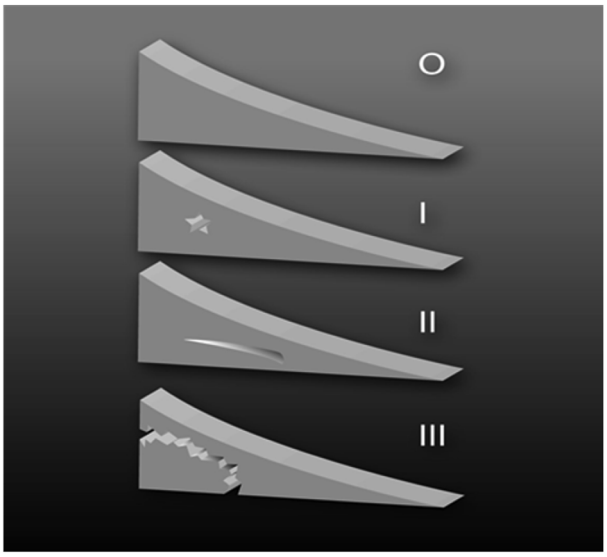
A traumatic and/or degenerative meniscus lesion is thought to be a clinical manifestation of early-onset osteoarthritis (OA), which is a chronic progressive condition that can cause substantial pain and disability. Platelet-rich plasma (PRP) is an emerging treatment option that has been reported to improve healing. Here, we present a case of a 29-year-old woman, with left anterior and medial knee pain, without history of trauma or injury. The patient was managed with leukocyte-poor PRP injections derived from her peripheral blood with high concentrations of platelets, platelet-derived growth factors, and bioactive proteins, with a total follow-up of 30 months. Post-treatment patient was evaluated at every follow-up for improvement using three independent measures, VAS, GROC, and KOOS. There was considerable improvement in the pain symptoms from baseline (VAS: 70 mm; GROC: n/a; and KOOS: 39) to 30 months (VAS: 40 mm; GROC: 5; and KOOS: 63.1) indicating that PRP injections can serve as therapeutic intervention for treatment of pain associated with early onset of OA. To further validate these results, more longitudinal and evidence-based studies are recommended, which may further guide the clinicians to manage early-onset OA with PRP.

1. Introduction

The menisci, attached between the lateral and medial articular surface of the femur and tibia, are two wedge-shaped, semicircular, fibrocartilaginous structures that provide shock absorption and load transmission during dynamic movements by having an innate resistance to compression, tension, and shear forces.[1] A traumatic meniscus lesion is thought to be a clinical manifestation of early-onset osteoarthritis (OA) since they have been shown to lead to fibrocartilage loss and eventual joint space narrowing.[2] The use of magnetic resonance (MR) imaging increases the ability to evaluate suspected meniscal tears, and the severity of the meniscal tear was assessed in terms of grades (0–III). This grading was given based on the MR images[3] (Fig. 1). OA itself is a chronic progressive condition that affects 13.9% of adults aged ≥25 years, 33.6% of adults, and a total of 27 million adults in the

* Corresponding author at: Dr. Humeira Badsha Medical Center, Dubai, United Arab Emirates. Tel.: +971 508921587; fax: +1 8779943500.
E-mail address: doctormurrell@gmail.com (W.D. Murrell).
http://dx.doi.org/10.1016/j.jcot.2016.05.002
0976-5662/

Please cite this article in press as: Betancourt JP, Murrell WD. Leukocyte-poor platelet-rich plasma to treat degenerative meniscal tear: A case report, *J Clin Orthop Trauma*. (2016), http://dx.doi.org/10.1016/j.jcot.2016.05.002



Grade 0: normal meniscus
Grade I: Focal mucoid degeneration of meniscus
Grade II: Linear mucoid degeneration that does not breach the surface of the meniscus
Grade III: Complete meniscal tear
- Grade IIIa-horizontal tear breaches one surface of the articular portion of the meniscus and exits the meniscus into the capsule.
- Grade IIIb – vertical tear that breaches both the superior and inferior portions of the meniscus.

Fig. 1 – Meniscal tear classification.[6]

United States with its prevalence increasing with age.[4] OA has multiple manifestations such as osteophyte and subchondral cyst formation, loss of joint cartilage with associated joint space narrowing, synovial inflammation, and sclerosis of subchondral bone and radiographic manifestations. Additionally, clinical complaints of pain, associated neuropathy, crepitus, and mechanical symptoms such as knee joint ''locking'', or ''lagging'' during dynamic movement.[1,2]

Although multiple conservative and surgical modalities exist to combat OA symptoms, their efficacy is limited mostly to short-term improvement with minimal to no impact on the natural progression of the disease, with the exception of joint replacement, which effectively cures the disease by replacing the entire joint itself, but with great risk and at a high financial cost.[3] The aging, baby-boomer population is expected to place a higher cost burden on existing health care systems and as such more treatment options have emerged to improve patient symptoms and functional outcomes. One emerging option is leukocyte-poor platelet-rich plasma injections (LP-PRP), which have been reported to improve wound and bone healing.[5] PRP injections are autologous, derived from the patient's peripheral blood with high concentrations of platelets, platelet-derived growth factors and bioactive proteins such as platelet-derived growth factor (PDGF) that influence healing on muscle, tendons, ligament, and bone.[6] Our purpose is to document significant improvement in validated-patient reported outcomes in a patient with grade 3a medial meniscus rupture with a total follow-up of 30 months following LP-PRP injection.

2. Case report

JN, a 29-year-old female with an unremarkable past medical history, was referred for a secondary injection after incomplete pain relief after a first series with hyaluronic acid derivative. She defined a left anterior and medial knee pain since 3 months before evaluation, without history of trauma or known mechanism of injury that has worsened since initial injection. Pain is described as sharp and intermittent with a Visual Analog Scale (VAS) Pain scale of 70.00 mm and a Knee Injury and Osteoarthritis Outcome Score (KOOS) of 39. She described a non-painful clicking as her only mechanical symptom, with pain being generated throughout ambulation, while running, transferring weight from chair, and squatting. Also, it should be mentioned that JN works as a flight attendant, and the very nature of her job requires that she stands and walks for very long periods of time. At the time of case study, the patient status was post two right meniscus debridements, the last, May 2005 on her right knee and her only medication was an oral contraceptive. She was married and self-described athletic with no pertinent family history of OA.

On initial examination, patient's left knee was without effusion or muscle strength deficit, but had palpable tenderness in the pes anserine region. Her patella had normal glide and tilt and her stability tests were normal. Her range of motion on her left knee was between 0° and 130°, which was diminished in comparison to her right knee (0°–145°). A McMurray test reproduced pain in her posteromedial left knee.

Magnetic Resonance Imaging (MRI) of the left knee revealed a grade 3a medial meniscus tear (Fig. 2).[3] Plain right posterior–anterior and lateral radiographs showed narrowing of medial tibiofemoral compartment, and posterior facial compartment. The patient was assessed as having early-onset OA in bilateral knee, a left knee meniscal tear with concurrent synovitis and chondromalacia. She did not wish to undergo surgery nor did she meet indications for surgical treatment by her treating orthopedic surgeon, at this time she was scheduled for LP-PRP injection 4 days later with informed consent.

Afterwards, 120 cc of whole blood was taken from the patient and placed in 180 cc closed angel blood separator system with 12 cc ADCA citrate. This was then processed with the counterweighted angel centrifuge for 15 min at 3200 rpm. The platelet-poor plasma (PPP) is automatically transferred into the PPP compartment, and then the desired buffy coat is separated and was placed into a 20 cc syringe by way of a different portal after being optically separated on 2% hemoglobin setting to limit red cells and white blood cells (Angel Blood Separator-Cytomedix, Maryland, USA).

The left lateral knee was anesthetized with 10 cc, 7.5 mg/ml (0.75%) ropivacaine (AstraZeneca, London, UK), given intra-articularly. Ultrasound-guided with linear probe (Acuson X300-Seimens AG, Munich, Germany), LP-PRP was then injected intra-articularly, that would be activated following contact with free ends of articular collagen found in a joint that has osteoarthritis. The patient tolerated the procedure and was given outpatient ambulatory clinic follow-up.

The patient follow-up was evaluated using three different and independent scoring outcomes used to objectively

Please cite this article in press as: Betancourt JP, Murrell WD. Leukocyte-poor platelet-rich plasma to treat degenerative meniscal tear: A case report, *J Clin Orthop Trauma*. (2016), http://dx.doi.org/10.1016/j.jcot.2016.05.002