Efficacy of Autologous Platelet-Rich Plasma Injections for Grade 3 Symptomatic Degenerative Meniscal Lesions: A 1-Year Follow-up Prospective Study

Mattia Alessio-Mazzola, MD,*†‡ Lamberto Felli, MD,†‡ Roberto Trentini, MD,‡ Matteo Formica, MD,†‡ Andrea Giorgio Capello, MD,‡ Stefano Lovisolo, MD,‡ and Nicola Maffulli, MD, MS, PhD, FRCP FRCS (Orth)§||¶#

Background: Platelet-rich plasma (PRP) injections have been proposed as a biologic option to provide symptomatic relief and delay surgery in patients with degenerative joint disease of osteoarthritis (OA). The efficacy of autologous PRP on symptomatic degenerative meniscal lesions (DMLs) has never been investigated.

Hypothesis: We hypothesized that patients with symptomatic DMLs without OA undergoing autologous PRP injections experience a significant clinical improvement at 12 months.

Study Design: Prospective case series.

Level of Evidence: Level 4.

Methods: A total of 69 patients with symptomatic DMLs without radiographic evidence of knee OA (Kellgren-Lawrence radiographic grading scale 0-1) received 4 autologous PRP injections once a week. Patients were prospectively evaluated before the injection and then at 1, 3, 6, and 12 months. Evaluation was based on Lysholm knee scoring scale (primary outcome), Western Ontario and McMaster Universities Arthritis Index (WOMAC), Tegner activity scale, and visual analogue scale scores.

Results: Patients treated with PRP injections demonstrated an improving knee function and symptoms over the duration of the study. A significant improvement from baseline to 12 months was observed in all the outcome measures, and no patients experienced failure or required surgery during the follow-up. Patients younger than 50 years reported lower subjective level of pain and higher Tegner activity scale at baseline and had significantly better Lysholm knee scoring scale ($P = 0.03$) and WOMAC ($P = 0.03$) scores at 6 months, as well as better range of motion at 3, 6, and 12 months ($P < 0.001$). Thirty-three (47.8%) patients were very satisfied, 26 (37.7%) satisfied, 8 (11.6%) partially satisfied, and 2 (2.9 %) not satisfied, with 62 (89.8%) patients willing to repeat the same treatment. No patient was lost to follow-up and no patient experienced adverse reaction, infection, failure, recurrence or underwent further surgery.

Conclusion: PRP injections provide short-term benefits in symptomatic DMLs. Although promising results were evident at 12 months, this is a preliminary study and no definitive recommendation can be made based, for example, on longer follow-up.

Clinical Relevance: This research supports the use of autologous PRP injections for symptomatic DMLs.

Keywords: degenerative meniscus; knee, platelet-rich plasma (PRP)

From †Department of Surgical Sciences (DISC), University of Genoa, Genoa, Italy, ‡Clinica Ortopedica e Traumatologica, Ospedale Policlinico San Martino, Genoa, Italy, §Department of Musculoskeletal Disorders, School of Medicine and Surgery, University of Salerno, Salerno, Italy, ||Clinica Ortopedica, Ospedale San Giovanni di Dio e Ruggi D'Aragona, Salerno, Italy, ¶Queen Mary University of London, Barts and the London School of Medicine and Dentistry, Centre for Sports and Exercise Medicine, Mile End Hospital, London, UK, and #School of Pharmacy and Bioengineering, Keele University of School of Medicine, Guy Hilton Research Centre, Hartshill, Stoke-on-Trent, UK

*Address correspondence to Mattia Alessio-Mazzola, MD, Department of Surgical Sciences (DISC), University of Genova, Orthopaedic Clinic, Ospedale Policlinico San Martino Largo Rosanna Benzi 10, Genova, 16132, Italy (email: mattia.alessio@hotmail.com).

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Degenerative meniscal lesions (DMLs) are highly prevalent in middle-aged subjects, with slow development of horizontal cleavage tears often involving the tibial side of the middle one-third and posterior horn of the medial meniscus.[28] The alteration of meniscal signal on magnetic resonance imaging (MRI) is the early sign of degenerative changes of the knee, and DMLs are commonly observed in subjects with radiographic evidence of knee osteoarthritis (OA).[19] Insidious onset of knee pain, joint line tenderness, and mechanical symptoms are frequently related to meniscal and cartilage lesions as a part of degenerative changes of the knee joint in middle-aged patients.[14,20] Recent level 1 evidence[4,29] recommends conservative measures as first-line management of symptomatic DMLs. Otherwise, arthroscopic partial meniscectomy (APM) is one of the most common orthopaedic procedures all over the world.[4,36]

Most randomized controlled trials on the management of DMLs demonstrated no concrete benefits of APM compared with sham surgery or conservative treatment in the middle term.[21,24,35,38] Several conservative measures have been proposed to decrease symptoms of DML as alternative to APM.[4,16,21,24,38] To the best of our knowledge, the efficacy of autologous platelet-rich plasma (PRP) injections in patients with symptomatic DMLs is still debated.

The aim of this study was to evaluate the clinical results of PRP injection in patients with meniscal symptoms, MRI evidence of DML, and no evidence of knee OA with minimum 1-year follow-up. We hypothesized that patients with symptomatic DMLs without OA undergoing autologous PRP injections would experience a significant clinically relevant improvement at 12 months.

METHODS

All the procedures described in the present investigations were approved by our institutional review board (N.188050220). All patients gave their written informed consent to participate in the study, which followed the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines and checklist.[37]

All patients seen in our tertiary referral university outpatient clinic between January 2018 and January 2019 with a suspected medial or lateral meniscal tear were assessed for eligibility. Patients were screened based on clinical, MRI, and radiographic findings.

Inclusion criteria were insidious onset of symptoms, mechanical symptoms (clicking, grinding, caching, or locking) of meniscal tear, a positive finding on 1 of 3 meniscus tests (McMurray, Apley, and Thessaly test), joint line tenderness over the corresponding aspect of the knee, MRI evidence of DML involving articular meniscus surface (grade 3 DML with horizontal or complex pattern[14]), no bony edema, and suitability for autologous PRP preparation.

Exclusion criteria were age <18 years and >65 years, history of knee sprain or trauma, varus or valgus mechanical axis (>5° from neutral), knee subjective or objective instability, previous knee surgery or injections on the affected side, evidence of radiographic knee OA (Kellgren-Lawrence radiographic grading scale[25] >1), intrameniscal signal abnormalities (grade 1-2) on MRI, traumatic meniscal tears (radial pattern, bucket-handle, longitudinal pattern, and flap),[14] meniscal extrusions, and preexisting medical conditions precluding autologous PRP preparation.

The pretreatment MRI study was performed from different radiological centers using standard protocols, including T1-weighted, T2-weighted, fat-suppressed T2-weighted axial, sagittal, and coronal sequences. No specific cartilage mapping sequences were added to standard protocols.

Imaging, objective, and subjective data of eligible patients were collected and screened by 2 trained orthopaedic residents.

All suitable patients were finally reviewed and approved for study inclusion by a fully trained knee surgeon. The interrater agreement was then calculated.

Figure 1 shows the flowchart and the study design.

The baseline functional assessment was performed with the Tegner activity scale, Lysholm knee scoring scale,[27] and Western Ontario and McMaster Universities Arthritis Index (WOMAC).[5] The subjective level of pain was assessed through the visual analogue scale (VAS) score.[12]

The clinical examination was conducted by inclusion by a fully trained knee surgeon to evaluate the presence of meniscal signs, ligament laxity, the active and passive range of motion measured with goniometer, and the presence of effusion classified with Coupens and Yates grading.[9]

In all included patients, a blood sample of 450 mL was taken and treated by the Department of Transfusion Medicine. The mean platelet (PLT) concentration in the blood sample was 250,000 platelets/mL. The blood underwent a standardized preparation with 3 consecutive centrifugations (Hettich Zentrifugen; Hettich Lab Technology): the first at 3550 rpm for 12 minutes, the second at 1100 rpm for 10 minutes, and the third at 2600 rpm for 20 minutes. The final product was than filtered and frozen (−80°C) in 4 test tubes for cryopreservation.

The PRP had a moderately elevated PLT concentration ranging from 250,000 to 900,000 per mL, with a mean value of 600,000 PLT per ML. Moderately elevated PLT concentration demonstrated optimal biological effects on musculoskeletal tissues.[1,7] Leukocytes (white blood cells [WBC]) were filtered during preparation with low concentration in the final product (<1000 WBC/mL). No activating agents were added. According to Kon classification,[26] the PRP used for this study was identified as 26-00-00.

The institutional protocol provided for 4 weekly intra-articular injections of 5 mL of autologous PRP for a total of 4 consecutive weeks of treatment. The goal of this specific protocol was to administer the obtained PRP volume of 20 mL ensuring a single low-volume (5 mL) injection. This specific standardized protocol resulted well tolerated, without side effects and demonstrated high patient compliance in previous clinical studies on different musculoskeletal disorders.[1,33]

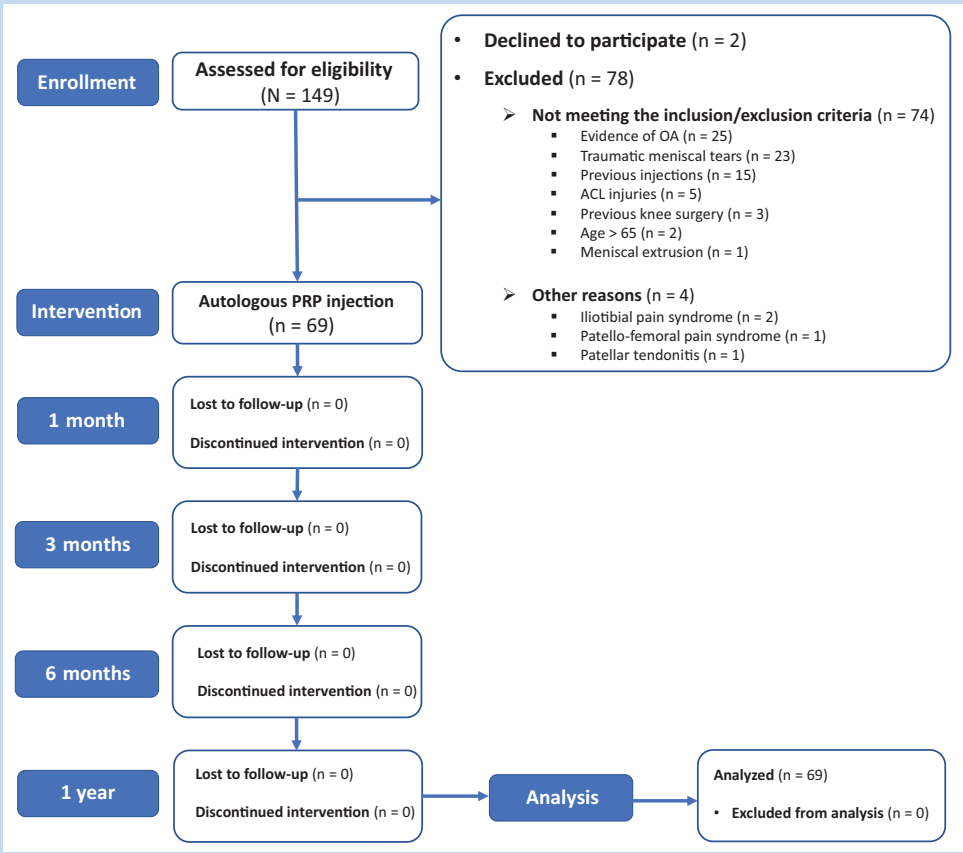

Figure 1. Flowchart with details of recruited and excluded patients with reasons. PRP, platelet-rich plasma.

No medications were prescribed, and self-medication with nonsteroidal anti-inflammatory drugs was strongly discouraged. Exercise or physical therapy was not formally prescribed, and patients were asked to gradually return to their normal working, recreational, or sporting activity after the last injection.

Patients were clinically reassessed at 4 weeks, 3 months, 6 months, and 1 year after the first injection with the same evaluation protocol including physical examination, functional scores, level of pain, and the level of subjective satisfaction with grading from 0 to 10 (0-3 not satisfied,4-5 partially satisfied, 6-7 satisfied, 8-10 very satisfied).

The primary outcome measure of the study was the Lysholm knee scoring scale,[27] and the secondary outcome measures were the WOMAC scores and the VAS scores.

Failure was defined as persistence of mechanical symptoms or absence of pain improvement at 3 months or any subsequent intervention or other kind of infiltration therapy on the affected knee.

Statistical Analysis

A power analysis was conducted to calculate the sample size. According to the literature, for a statistical power of 80% and a level of significance of 0.05, a total of 64 cases are needed to observe a significant difference between the baseline and the final values of Lysholm knee scoring scale of 7 points with a standard deviation of 20.[35]

Continuous variables were expressed as mean ± standard deviation, relative 95% CIs, and ranges. Categorical variables were reported as the number of cases and percentage. The Shapiro-Wilk test was used to identify normally distributed variables. Differences between means were tested with the Mann-Whitney *U* test. The nonparametric Wilcoxon signed-rank test was used to compare continuous paired data. Categorical variables were tested with the chi-square test or Fisher exact test.

Interobserver reliability was calculated for radiographic knee OA grade, meniscal MRI, and clinical assessment. Kappa (κ) coefficient values were interpreted as poor (κ = 0.0-0.20), fair (κ = 0.21-0.40), moderate (κ = 0.41-0.60), good (κ = 0.61-0.80), or excellent (κ = 0.81-1.0).

Factors potentially influencing the clinical outcome (age, sex, body mass index [BMI], duration of symptoms, comorbidities, and smoking status) were analyzed with univariate analysis. A subgroup analysis of outcome measures in patients stratified for age, sex, BMI, comorbidities, smoking status, duration of symptoms, and meniscal tear pattern was performed.

Post hoc repeated measures analysis of variance was used to assess changes in mean scores over 3 or more time points. A P value <0.05 was considered statistically significant.

Table 1. Baseline demographic, clinical, and functional features of enrolled patients (N = 69)[a]

	Value	SD	95% CI	Range	*P*
Demographic data					
Age, y	52.1	7.8	50.3-54.0	36-62	<0.001[b]
BMI, kg/m^2	26.6	4.4	25.6-27.6	19-34	<0.001[b]
Sex, male/female	21 (30.4%)/ 48 (69.6%)	—	—	—	—
Side, right/left	36 (52.2%)/ 33 (47.8%)	—	—	—	—
Comorbidities	5 (7.2%)	—	—	—	—
Smoking status	6 (8.6%)	—	—	—	—
Radiological data					
KL grade 0	47 (68.1%)	—	—	—	—
KL grade 1	22 (31.9%)	—	—	—	—
DML PHMM[c]	69 (100.0%)	—	—	—	—
Horizontal tears	63 (91.3%)	—	—	—	—
Complex tears	6 (8.7%)	—	—	—	—
Subjective clinical data					
Gradual onset of symptoms	58 (84.1%)	—	—	—	—
Pain after activities	11 (15.9%)	—	—	—	—
Mechanical symptoms	69 (100.0%)	—	—	—	—
Clicking	34 (49.3%)	—	—	—	—
Locking	31 (44.9%)	—	—	—	—
Caching	4 (5.8%)	—	—	—	—
Objective clinical data					
Joint line tenderness	69 (100.0%)	—	—	—	—
Positive McMurray test	19 (27.5%)	—	—	—	—
Positive Apley test	16 (23.2%)	—	—	—	—
Positive Thessaly test	48 (69.6%)	—	—	—	—
Duration of symptoms, mo	8.7	3.7	7.8-9.6	3-16	<0.001[b]
Quadriceps strenght[d]	4.9	0.2	4.9-5.0	4-5	<0.001[b]
Effusion[e]	0.2	0.4	0.1-0.3	0-1	<0.001[b]
Range of motion[f]	130	7.5	120.0-132.6	110-135	<0.001[b]
Extension lag	0 (0%)	—	—	—	—

(continued)

Table 1. (continued)

	Value	SD	95% CI	Range	*P*
Functional scores					
Lysholm	72.9	7.3	71.3-74.5	59-95	0.002[b]
Tegner activity scale	4.3	1.1	4.1-4.6	3-7	<0.001[b]
WOMAC	77.7	11.3	75.6-79.7	59-97	0.002[b]
VAS[g]	5.3	2.0	4.7-5.6	2-8	<0.001[b]

BMI, body mass index; DML, degenerative meniscal lesion; KL, Kellgren-Lawrence; PHMM, posterior horn of medial meniscus; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Arthritis Index.
[a]Data are presented as mean value or number (percentage).
[b]Significant *P* value represents not normally distributed variables (Shapiro-Wilk test)
[c]Magnetic resonance imaging meniscus findings.
[d]Quadriceps strength evaluation from 0 (no contraction) to 5 (normal strength).
[e]Measured with Coupens and Yates score from 0 (no effusion) to 4 (tense effusion).
[f]Sum of flexion and extension degrees.
[g]Maximum perceived pain during the day.

RESULTS

Of the 149 consecutive patients who were eligible for enrollment, 2 declined to participate and 78 were excluded for specific reasons (Figure 1). Therefore, 69 consecutive patients (69 knees) with a minimum 1-year follow-up were recruited in this single-center prospective study. All the patients completed the 4 injections and there was no loss to follow-up. The clinical assessment and MRI confirmed a DML of posterior horn of the medial meniscus in all cases.

The interobserver reliability for radiographic, MRI, and clinical evaluation was $\kappa = 0.97$, $\kappa = 0.93$, and $\kappa = 0.88$, respectively.

The mean age at baseline was 52.1 ± 7.8 (range: 36-62) years; 5 (7.2%) patients were hypertensive and 6 (8.6%) were smokers (less than 1 pack/year). No other comorbidities were reported and all recruited patients were suitable for autologous PRP treatment.

The baseline characteristics of patients with details of clinical and functional scores are reported in Table 1. A significant improvement from baseline to 12 months was observed in all the outcome measures (Figure 2) and no patients had failure or required surgery or other interventions during the follow-up (Tables 2 and 3).

The subgroup analysis of outcome measures in patients stratified for age, sex, BMI, comorbidities, smoking status, duration of symptoms, and tear pattern (complex tear vs horizontal tear) showed no significant differences at any time point except for age.

Patients younger than 50 years reported lower VAS score ($P < 0.01$) and higher Tegner activity scale score ($P = 0.04$) at baseline. Moreover, patients younger than 50 years had significantly better Lysholm knee scoring scale ($P = 0.03$) and WOMAC ($P = 0.03$) scores at 6 months and better range of motion at 3, 6, and 12 months ($P < 0.01$).

Table 4 shows the details of outcome measures with results stratified for age.

At final follow-up, the patients reported a mean value of subjective satisfaction (measured from 0 to 10) of 8.0 ± 2.0 (from 4 to 10).

Thirty-three (47.8%) patients were very satisfied, 26 (37.7%) satisfied, 8 (11.6%) partially satisfied, and 2 (2.9 %) not satisfied; 62 (89.8%) patients were willing to repeat the same treatment.

There was no loss to follow-up and no patient reported adverse reactions, infection, failure, recurrence, or surgery. No patients had any additional intervention during the follow-up.

DISCUSSION

The main finding of the present study is that PRP injections are a reliable management modality for middle-aged patients with symptomatic DML, providing a significant improvement of clinical symptoms for up to 12 months.

A preserved meniscus plays a key role in maintaining normal joint contact forces: APM can result in decreased shock absorption and subsequent development of degenerative OA.[24,31] There is much interest in conservative solutions for the management of DMLs. Kaminski et al[23] reported a significant improvement in the rate of chronic meniscal tear healing with a percutaneous meniscal trephination augmented with PRP.

The efficacy of PRP injection for knee OA has been previously demonstrated by high level of evidence studies.[2,8,10,11,15,34] Di Martino et al[11] reported the clinical results of PRP on 85 patients with knee OA at 5 years with stable improvement for up to 24 months. Cole et al[8] showed that PRP injections significantly

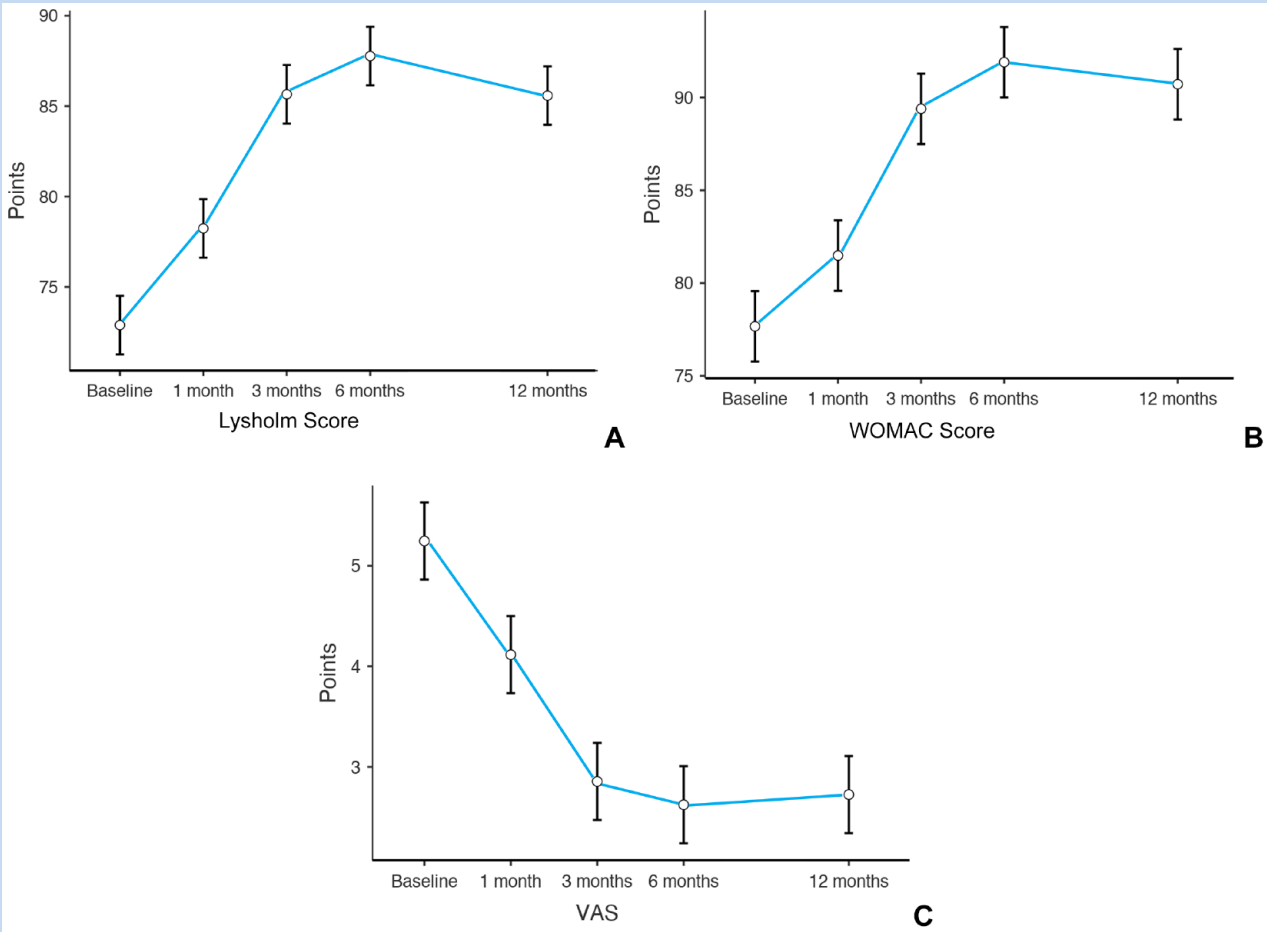

Figure 2. Progression of Lysholm score (A), WOMAC score (B), and VAS score (C) over the study period. VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Arthritis Index.

Table 2. Overall results of functional and clinical scores with mean values, standard deviations, range of values (in parentheses) and *P* value calculated with ANOVA[a]

	Baseline	1 Month	3 Months	6 Months	12 Months	*P*
Lysholm	72.9 ± 7.3 (59-95)	78.2 ± 7.95 (66-100)	85.7 ± 7.1 (72-100)	87.8 ± 5.9 (76-100)	85.6 ± 5.6 (75-94)	<0.001[b]
WOMAC	77.7 ± 11.3 (59.1-97.0)	81.5 ± 10.2 (57.0-98.5)	89.4 ± 6.5 (75.0-98.5)	91.9 ± 4.9 (82.0-98.5)	90.7 ± 4.7 (82-96.2)	<0.001[b]
VAS[c]	5.3 ± 2.0 (2-8)	4.1 ± 2.0 (0-7)	2.8 ± 1.5 (0-5)	2.6 ± 1.2 (0-4)	2.6 ± 1.3 (0-4)	<0.001[b]
ROM[d]	131 ± 7.7 (110-135)	131 ± 135 (110-135)	133 ± 5.2 (120-135)	133 ± 5.2 (120-135)	133 ± 5.2 (120-135)	<0.001[b]

ANOVA, analysis of variance; ROM, range of motion; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Arthritis Index.
[a]Data are presented as means ± standard deviations, and range of values.
[b]Statistically significant difference between groups with ANOVA ($P < 0.05$).
[c]Maximum perceived pain during the day.
[d]Sum of flexion and extension degrees.

Table 3. Post hoc comparison of outcome measures

Comparison		*P*
Lysholm		
Baseline	1 month	<0.001[a]
	3 months	<0.0001[a]
	6 months	<0.001[a]
	12 months	<0.001[a]
1 month	3 months	<0.001[a]
	6 months	<0.001[a]
	12 months	<0.001[a]
3 months	6 months	0.101
	12 months	1.000
6 months	12 months	0.082
WOMAC		
Baseline	1 month	<0.001[a]
	3 months	<0.001[a]
	6 months	<0.001[a]
	12 months	<0.001[a]
1 month	3 months	<0.001[a]
	6 months	<0.001[a]
	12 months	<0.001[a]
3 months	6 months	0.02
	12 months	0.21
6 months	12 months	0.26
VAS		
Baseline	1 month	<0.001[a]
	3 months	<0.001[a]
	6 months	<0.001[a]
	12 months	<0.001[a]
1 month	3 month	<0.001[a]
	6 months	<0.001[a]
	12 months	<0.001[a]
3 months	6 months	0.58
	12 months	0.92
6 months	12 months	0.97
ROM		
Baseline	1 month	1.000
	3 months	0.001[a]
	6 months	0.001[a]
	12 months	0.001[a]
1 month	3 months	0.001[a]
	6 months	0.001[a]
	12 months	0.001[a]
3 months	6 months	1.000
	12 months	1.000
6 months	12 months	1.000

ROM, range of motion; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Arthritis Index.
[a]Statistically significant values ($P < 0.05$).

reduce pain and increase the knee function in 49 patients with knee OA at 6 months. PRP therefore has the potential to reduce the pain associated with knee OA, but the severity of knee OA, and the number and frequency of injections to be administered are highly heterogeneous, making definite recommendations difficult.[2,8,10,11,15,34]

Despite the increasing interest in biologic therapies and regenerative medicine for the management of musculoskeletal disorders and meniscal pathologies,[3,18,30] the efficacy of PRP on DMLs is still debated.[2,4,6,23,29] The potential benefit of PRP on meniscal tears is supported by basic science research, as in vitro and animal studies show that PRP could enhance meniscal cell proliferation and stimulate repair.[17,22]

Everhart et al[13] reported a strong protective effect of intraoperative PRP application on meniscus repair without concomitant anterior cruciate ligament reconstruction over 3 years. The failure rate of isolated arthroscopic meniscus repairs with PRP augmentation was significantly reduced. A case-control study on 34 patients undergoing open meniscus repair with minimum 2-year follow-up showed the beneficial effect of intraoperative PRP application in 17 patients younger than 40 years with symptomatic horizontal tears of meniscus. Despite the limited sample size, PRP augmentation improved the clinical outcome of repaired horizontal tear of meniscus.[32]

In several studies, nonstandardized PRP preparations of heterogeneous composition were used, precluding strong conclusions on the therapeutic effects of the final products being delivered to patients. A precise, stepwise and detailed description of the preparation protocol is mandatory to allow

Table 4. Clinical results with mean values and standard deviations of patients stratified for age

	Age <50 y	Age ≥50 y	*P*
Patients	20 (29%)	49 (71%)	
Baseline			
Lysholm	71.1 ± 3.6	73.2 ± 8.3	0.07
WOMAC	81.4 ± 9.3	76.1 ± 11.8	0.17
VAS	4.6 ± 1.4	5.5 ± 2.0	0.04[a]
Tegner activity scale	4.8 ± 1.2	4.1 ± 0.9	0.04[a]
ROM	129 ± 7.5	132 ± 7.4	0.10
1 Month			
Lysholm	75.6 ± 3.9	79.3 ± 8.9	0.08
WOMAC	79.9 ± 6.2	82.1 ± 11.5	0.07
VAS	4.6 ± 2.2	3.9 ± 1.9	0.27
ROM	129 ± 7.5	132 ± 7.4	0.10
3 Months			
Lysholm	85.6 ± 4.8	85.7 ± 7.9	0.71
WOMAC	89.3 ± 5.9	89.4 ± 6.8	0.94
VAS	2.8 ± 1.6	2.9 ± 1.4	0.92
ROM	134 ± 2.8	130 ± 7.5	<0.001[a]
6 Months			
Lysholm	90.0 ± 1.8	86.9 ± 6.7	0.03[a]
WOMAC	94.3 ± 2.0	90.9 ± 5.4	0.03[a]
VAS	2.4 ± 1.2	2.7 ± 1.2	0.34
ROM	134 ± 2.8	130 ± 7.5	<0.001[a]
12 Months			
Lysholm	87.2 ± 4.8	84.9 ± 5.8	0.13
WOMAC	92.2 ± 3.6	90.1 ± 5.0	0.12
VAS	2.9 ± 1.2	2.7 ± 1.3	0.19
ROM	134 ± 2.8	130 ± 7.5	<0.001[a]

ROM, range of motion; VAS, visual analogue scale; WOMAC, Western Ontario and McMaster Universities Arthritis Index.
[a]Statistically significant values ($P < 0.05$).

comparisons among studies and provide details on the safety and reproducibility of this therapeutic method.[7,26] Regarding this specific topic, Kon et al[26] proposed a new classification to quickly identify the type of PRP and to allow prompt comparison among different products.

The use of PRP remains controversial in meniscus pathologies. To our knowledge, however, there are no prospective studies evaluating the use of PRP injections in DMLs. The present investigation showed that PRP injections in patients with symptomatic DMLs without radiographic evidence of knee OA

and MRI evidence of subchondral bone edema were effective in improving knee function and symptoms over time, with stable results by 12 months after PRP administration regardless of the specific tear pattern (horizontal or complex tears). Moreover, younger patients seem to have stronger short-term benefits at 6 months. In the present study, we only included patients with a symptomatic degenerative lesion of medial meniscus. Obviously, we do not know whether such encouraging results are applicable to degenerative lesions of the lateral meniscus. Also, we point out that all our patients did not present with clinically relevant varus or valgus malalignment or knee OA. We caution that if varus or valgus exceeds the physiological limits, correction of the mechanical axis should be sought. Finally, patients with radiographic evidence of knee OA were excluded from this research and further studies are requested to clarify how specific degenerative joint changes and DMLs could influence the clinical efficacy of autologous PRP injections.

The present study does have limitations. This is an observational prospective case series, and, although well defined, there is no control group. The follow-up is relatively short to assess the long-term efficacy of PRP injections for DMLs. The results are only based on clinical findings and functional scores, and there are no follow-up imaging studies, MRI cartilage mapping, or arthroscopic evaluations to assess meniscus healing, tear progression, and cartilage status. Finally, there is a moderate risk of bias (selection bias and bias in measurement of outcomes). We point out, however, that the present investigation was performed within a National Health System environment, and therefore we were not able to obtain funding for imaging at 12 months from the index intervention.

On the other hand, the present study was well powered to detect a difference in outcome after PRP injection, has a prospective design with strict inclusion criteria, and a homogenous population, with no loss to follow-up. Also, all the patients were tertiary referrals and had already failed conservative managements for their symptoms before being referred to our university center.

CONCLUSION

PRP injections provide short-term benefits in symptomatic DMLs. Although the patients experienced promising stable results by 12 months, this is a preliminary study, and no strong recommendations can be made. The use of PRP in this pathology should be further evaluated with appropriately powered randomized controlled trials with longer follow-up, suitable outcome measures and postintervention imaging.

ORCID IDS

Mattia Alessio-Mazzola https://orcid.org/0000-0001-6741-3713
Nicola Maffulli https://orcid.org/0000-0002-5327-3702

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