Intra-Articular Injection of PRP vs Viscosupplementation in Treating Hemophilic Arthropathy of the Knee Joint

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Introduction

The currently available drugs, which include analgesics, corticosteroids, nonsteroidal and steroidal anti-inflammatory drugs, and hyaluronic acid (HA), for the treatment of hemophilic arthropathy are predominantly effective in symptomatic relief of pain and inflammation. Although knee arthroplasty is a reliable and effective surgical treatment for end-stage haemophilic arthropathy, delaying total knee replacement is necessary because most patients undergo revision surgery 10–15 years later.

Intra-articular platelet-rich plasma (PRP) injection is an easy and minimally invasive method that provides a natural concentrate of autologous growth factors from the blood. This method of regeneration medicine is now being increasingly applied in clinical practice to treat musculoskeletal disorders, such as tendon injury and osteoarthritis. Growth factors including platelet-derived growth factor, insulin growth factor, vascular endothelial growth factor, and transforming growth factor beta-1 are probably the major components of PRP that help structural repair.

The aim of the present study was to investigate the efficacy, safety, and duration of benefit of a single intra-articular PRP injection versus 5 weekly intra-articular injections of HA in patients with haemophilic arthropathy of the knee.

Materials and methods

Hemophilia patients, who had persistent painful haemophilic arthropathy of the knee (visual analogue score [VAS] ≥3) despite medication for at least 6 months, were included in the study. The exclusion criteria were as follows: age <20 years, presence of joint infections, surgery on the joint in the preceding 12 months, intra-articular corticosteroid or HA injection within the past 6 months, treatment with systemic steroids, history of rheumatoid arthritis or gouty arthropathy, history of chicken or egg allergy, presence of neoplasm, use of nonsteroidal anti-inflammatory drugs during the 5 days before blood collection for preparing PRP, platelet values <100,000/mm3, acute haemarthrosis, paresis, and recent trauma. 22 patients were enrolled in the study. Before starting the treatment, a baseline ultrasound evaluation was performed. Patients of the PRP group received a single intra-articular injection of 2 mL PRP (RegentKit-THT-1) and patients of the HA group received 5 weekly intra-articular injections of 2.5 mL hyaluronate sodium (ARTZDispo). Before the respective injections, the patients of both groups received 25 IU/kg of factor replacement therapy for protection against haemarthrosis. After the respective injections, the joint was rested for 20 minutes and compression was applied with an elastic bandage to minimize any injection-related bleeding. All outcome measurements were performed initially at baseline and subsequently, at 1, 2, 3, and 6 months after the last injection.

Results

No severe adverse events or injection related hemarthroses were reported. In the PRP group, a significant reduction in pain from haemophilic arthropathy of the knee was observed for 6 months ($F=17.76$, $p<0.01$). The WOMAC score significantly improved for 6 months after the injection ($F=4.78$, $p<0.01$). Moreover, a significant improvement in synovial hyperemia was achieved ($F=4.16$, $p<0.05$). No significant change in the SF-36, synovial thickness, and haemarthrosis was observed. Changes from the baseline levels of the VAS, SF-36, WOMAC, ROM, haemarthrosis, hyperemia, and synovial thickness to those observed at 1, 2, 3, and 6 months are shown in Table 2.

Table 1. Demographic characteristics of haemophilia patients

Characteristic	PRP (n=11)	HA (n=11)	*p* Value
Age, year±SE	41.3±2.3	38.8±2.4	.47
BH, cm±SE	170.4±2.3	170.0±1.8	.90
BW, kg±SE	69.5±4.7	73.4±4.8	.57
BMI, kg/m²±SE	23.9±1.4	25.4±1.7	.49
Severity			
A, severe	9	9	
A, moderate	1	1	
B, severe	1	1	
HIV	1	2	.53
Inhibitor	2	0	.14
Injected knee right/left	11 4/7	11 4/7	
Pettersson score±SE	9.6±0.3	9.0±0.7	.51

BMI, body mass index; BH, body height; BW, body weight; HA, hyaluronic acid; HIV, human immunodeficiency virus; PRP, platelet-rich plasma;

Tab. 1 Demographic characteristics

PRP vs HA

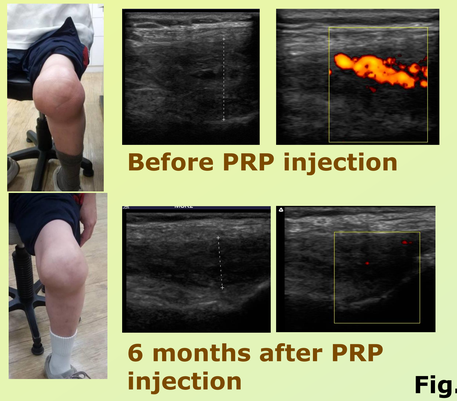
Regarding clinical outcome, both treatments proved to be effective in reducing pain and improving the functional status of the knee. Figure 1 and Figure 2 showed difference of VAS and WOMAC score before and after treatment. The difference of VAS and WOMAC score in PRP group were significant larger than those of HA group at 6 month. However, the comparative analysis showed no significant intergroup difference at the follow-ups in the other evaluated clinical scores.

Table 2. Outcome measures of PRP & HA injected knees at baseline and six-month follow-up

	Group	baseline	1 month	2 months	3 months	6 months	RM ANOVA
VAS	PRP	5.0±0.6	2.5±0.8***	2.4±0.8***	2.5±0.8***	2.6±0.7***	F=17.76, p<0.01
	HA	4.1±0.5	1.8±0.5***	1.6±0.5***	2.3±0.6*	3.4±0.5	F=13.33 , p<0.01
SF-36	PRP	56.7±5.3	62.8±4.6	63.5±4.1	61.7±4.7	65.1±3.7	NS
	HA	54.7±4.9	58.5±5.0	63.5±3.6	63.3±3.1	58.3±4.7	NS
WOMAC	PRP	38.3±3.4	28.7±3.7**	27.3±3.3**	29.9±3.9*	29.4±3.7*	F=4.78, P<0.01
	HA	33.4±5.5	19.1±3.9**	21.3±3.7*	27.1±4.7	35.8±5.0	F=9.27, p<0.01
ROM (degree)	PRP	92.5±8.5	99.5±7.6	102.3±7.9	101.4±7.8	100.9±8.5	NS
	HA	90.9±8.3	91.8±8.1	91.8±8.1	91.8±8.1	91.8±8.1	NS
Hemarthrosis	PRP	0.5±0.2	0.4±0.2	0±0	0.6±0.3	0.4±0.3	NS
	HA	0.7±0.2	0.4±0.1	0.3±0.1	0.3±0.2	0.6±0.2	NS
Hyperemia (score)	PRP	1.0±0.3	0.9±0.3	0.3±0.2**	0.4±0.2*	0.3±0.1*	F=4.16, p<0.05
	HA	0.9±0.2	0.4±0.1**	0.2±0.1**	0.2±0.1*	0.3±0.1*	F=5.63, p<0.05
Thickness of synovium (mm)	PRP	8.0±1.3	7.1±1.0	7.0±1.3	7.2±1.2	6.9±1.0	NS
	HA	6.9±1.0	6.5±1.2	6.1±1.1	6.0±1.1	6.0±1.1	NS

RM ANOVA, repeated-measure analysis of variance; ROM, Range of Motion; SF-36, Short Form-36; VAS, Visual Analogue Scale; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index
Significant difference compared to baseline, *p<0.05, **p<0.01, ***p<0.001

Tab. 2 Outcome measures of PRP & HA injected knees



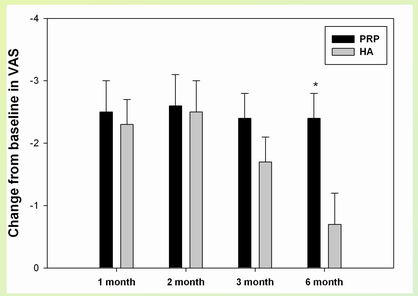


Fig. 1 Mean of change from baseline in VAS in PRP and HA groups

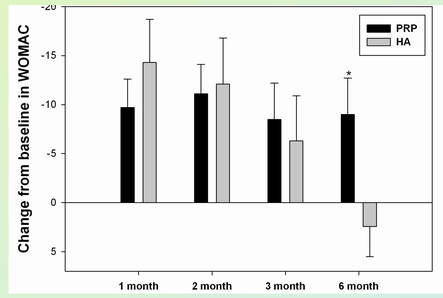


Fig. 2 Mean of change from baseline in WOMAC in PRP and HA groups

Conclusion

Our results demonstrated that single PRP injections were safe and effective in treating haemophilic arthropathy of the knee for up to 6 months. The treatment not only improved the pain and knee function but also reduced synovial hyperemia. PRP injections showed longer efficacy than HA injections in reducing pain and improving knee function. PRP therapy could have the potential to be the treatment of choice in haemophilic arthropathy of the knee. Finally, it may also serve as a temporary measure to delay total knee arthroplasty.