

Combined Intra-Articular Injections of Triamcinolone Hexacetone, Platelet-Rich Plasma and Hyaluronic Acid for the Treatment of Early and Advanced Knee Osteoarthritis

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DISCLOSURE STATEMENT

- The authors have nothing to disclose.

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BACKGROUND

- Osteoarthritis (OA) is one of the major causes of knee pain and is detrimental to quality of life.
- Total knee arthroplasty (TKA) is the definitive treatment for patients with knee OA, but as a considerable number of TKAs (18%) will need revision within 25 years [1]. The TKA solution should be delayed when possible. especially in younger individuals.
- Current evidence demonstrates that hyaluronic acid (HA) and platelet-rich plasma (PRP) intra-articular injections can be viable options for knee OA when compared to other non-operative treatment modalities (corticosteroids. oral non-steroidal anti-inflammatory drugs. or placebo) [2,3], and may be used in a combined treatment (PRP+HA) [4].

[1] Evans et al. (2019) Lancet. 393:655-663

[2] Oeding et al. (2024) AJSM. 52(12). 3147-3160

[3] Jawanda et al. (2024) Arthroscopy. 40(5). 1623-1636

[4] Du & Liang (2025) J Orthop Surg Res. 20(1). 57

PURPOSE

The purpose of this study was to evaluate the efficacy of a treatment strategy combining an intra-articular injection of triamcinolone hexacetonide followed one week later by combined intra-articular injection of PRP+HA, comparing between knees with early knee OA and those with advanced knee OA.

METHODS

Prospective case series (Porto, Portugal)

Inclusion criteria:

- ✓ all consecutive adult patients (>18 years old)
- ✓ With symptomatic and radiographic knee OA
- ✓ that received intra-articular injection of PRP + HA

Exclusion criteria:

- x previous knee surgery
- x diagnosis of autoimmune or platelet diseases
- x took NSAIDs drugs 3 days prior to injection
- x had history of repeated use of corticosteroids

Procedures

- Patients were divided into early (grades I/II) and advanced (grades III/IV), according to the Kellgren-Lawrence scale.

Outcome measures

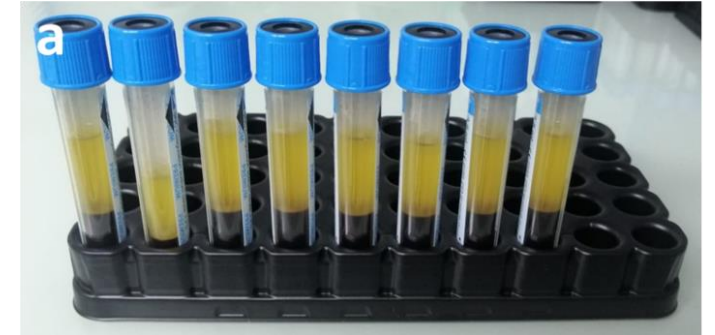
- KOOS
- VAS

At baseline and 2, 6 and 12 months of follow-up.

METHODS

Procedures

- All patients received an intra-articular injection of 2 mL of Lederlon® solution which contains Triamcinolone Hexacetonide (40 mg) to decrease local inflammatory response. Then, after one week, patients received intra-articular injection of PRP + HA.
- The PRP was obtained from 54 mL sample of venous blood and centrifuged at 2400 rpm for 8 minutes. The suspended concentration of PRP was carefully extracted using a pipette to avoid aspiration of leukocytes from the buffy coat (leukocyte-poor PRP). It was injected 8 ml of PRP into the knee.
- The HA product consisted on 20 mL of low-weight HA.



METHODS

- A total of 51 patients with diagnosis of knee OA were included (n=17 with early OA; n=34 with advanced OA).
- Patients' demographics (age, sex and body mass index) were homogenous at baseline between groups.
- Level of physical activity (Tegner) and symptom duration were also homogenous at baseline.

		Early OA (I-II) (n=17)	Advanced OA (III-IV) (n=34)	P value
Age (years)		70.0 ± 8.6	71.7 ± 9.7	0.424*
Sex	Female	11 (65%)	23 (67%)	0.834**
	Male	6 (35%)	11 (32%)	
BMI (Kg/m²)		25.9 ± 4.6	28.6 ± 4.3	0.889*
Tegner scale		1.9 ± 1.4	1.7 ± 1.2	0.921*
Symptoms duration (months)		37.5 ± 59.9	50.3 ± 67.1	0.280*

RESULTS

- At baseline, knees with advanced OA displayed worse impairments in KOOS-ADL and KOOS-Sports.
- All other outcomes were homogenous at baseline.

KOOS domains	Early OA (I-II) (n=17)	Advanced OA (III-IV) (n=34)	p*
KOOS-Pain	47.2 (26.4)	29.2 (34.0)	0.057
KOOS-Symptoms	53.8 (44.6)	42.86 (33.9)	0.327
KOOS-ADL	57.4 (34.6)	36.0 (34.6)	0.045
KOOS-Sports	15.0 (20.0)	5.0 (10.0)	0.023
KOOS-QoL	25.0 (34.4)	18.8 (26.6)	0.425
KOOS-TOTAL	50.0 (25.3)	28.6 (31.1)	0.071
Pain (VAS)	7 (2)	8 (1)	0.683

RESULTS

- Both groups showed a significant improvement in all outcomes at 2 months follow-up ($P < 0.05$).
- The improvement was significantly superior in the advanced knee OA in most of KOOS domains, except for the KOOS-Sports.

KOOS domains	Change from baseline to 2 months		p*
	Early OA (I-II) (n=17)	Advanced OA (III-IV) (n=34)	
KOOS-Pain	16.8 ± 17.3	41.7 ± 21.1	<0.001
KOOS-Symptoms	13.4 ± 17.9	38.8 ± 21.3	<0.001
KOOS-ADL	11.9 ± 23.5	38.6 ± 21.6	<0.001
KOOS-Sports	12.4 ± 19.4	15.1 ± 17.9	0.637
KOOS-QoL	9.2 ± 24.1	35.3 ± 22.4	0.001
KOOS-TOTAL	13.0 ± 17.4	36.2 ± 17.8	<0.001
Pain (VAS)	-2.4 ± 2.4	-3.3 ± 2.1	0.233

RESULTS

- At 6 months, knees with advanced OA showed a significantly worsening of results for KOOS-Pain and KOOS-ADL domains and KOOS total score as compared to those with early knee OA.

KOOS domains	Change from 2 to 6 months		p*
	Early OA (I-II) (n=17)	Advanced OA (III-IV) (n=34)	
KOOS-Pain	0.0 ± 15.4	-10.7 ± 19.7	0.020
KOOS-Symptoms	-0.4 ± 15.5	-9.3 ± 20.5	0.082
KOOS-ADL	-2.5 ± 17.5	-12.6 ± 19.4	0.021
KOOS-Sports	-0.3 ± 13.7	-7.6 ± 16.1	0.107
KOOS-QoL	-2.6 ± 18.4	-3.3 ± 20.3	0.636
KOOS-TOTAL	-1.4 ± 13.9	-10.1 ± 17.2	0.028
Pain (VAS)	0.1 ± 2.0	0.6 ± 2.5	0.270

RESULTS

- At 12 months, the improvement was not statistically significant between groups for any of the outcomes evaluated ($P > 0.05$).

KOOS domains	Change from baseline to 12 months		p*
	Early OA (I-II) (n=17)	Advanced OA (III-IV) (n=34)	
KOOS-Pain	24.3 ± 19.5	23.4 ± 28.5	0.889
KOOS-Symptoms	21.2 ± 24.3	14.4 ± 28.0	0.279
KOOS-ADL	16.0 ± 26.1	20.2 ± 28.2	0.624
KOOS-Sports	9.1 ± 25.5	7.9 ± 21.9	0.696
KOOS-QoL	21.7 ± 24.6	20.0 ± 29.1	0.810
KOOS-TOTAL	18.4 ± 20.6	18.5 ± 24.6	0.984
Pain (VAS)	-2.4 ± 3.4	-1.6 ± 2.6	0.142

RESULTS

- When controlling for almost all baseline characteristics, the significant prognostics factors for change on KOOS Total score from baseline to 12 months follow-up were the Tegner scale, durations of symptoms and KOOS Total baseline score.
- The change on KOOS Total score at 12 months follow-up is equal to: $56.595 - (5.880 \times \text{Tegner scale}) + (0.118 \times \text{duration of symptoms}) - (0.690 \times \text{KOOS Total baseline score})$.
- Change of KOOS Total score at 12 months of follow-up increases by 5.88 points for each point increase in the Tegner scale at baseline, decreases by 0.118 points for each additional month of symptom duration, and decreases by 0.69 points for each point increase in baseline KOOS score.

Variable	B	Beta	t	P
(Constant)	56.595		0.723	0.474
Age (years)	0.279	0.111	0.702	0.487
Sex	0.662	0.054	0.402	0.690
BMI (Kg/m ²)	0.164	0.031	0.207	0.837
OA Grade	-4.519	-0.090	-0.633	0.530
Tegner scale	5.880	0.314	2.040	0.048
Duration of symptoms	-0.118	-0.326	-2.379	0.022
Baseline VAS	-1.765	-0.103	-0.549	0.586
Baseline KOOS Total	-0.690	-0.568	-2.929	0.006

CONCLUSION

A combined strategy of intra-articular injection of triamcinolone hexacetonide and one week later an intra-articular injection of PRP+HA displays a more significant improvement of patient-reported outcomes at two months in knees with advanced OA.

However, the outcomes leveled out with those with early OA at 6 months, without significant differences at 12 months follow-up.