

Intra-Articular Methylprednisolone Injection for Advanced Osteoarthritis in Geriatric Patient Population

Ali Yüce¹  Niyazi İğde²  Tahsin Olgun Bayraktar³  Mustafa Yerli³ 

Ali Çağrı Tekin³  Mehmet Kürşad Bayraktar³  Hakan Gürbüz³ 

1 Health Sciences University, Başakşehir Çam ve Sakura City Hospital, Department of Orthopedics and Traumatology, İstanbul, Turkey

2 Şanlıurfa Akçakale State Hospital, Department of Orthopedics and Traumatology, Şanlıurfa, Turkey

3 Health Sciences University, Prof Dr Cemil Taşcıoğlu City Hospital, Department of Orthopedics and Traumatology, İstanbul, Turkey

Abstract

Background: We aimed to investigate the effect of intra-articular methylprednisolone injection on pain and functional outcomes and the number of outpatient clinic admissions in patients with advanced knee osteoarthritis in the geriatric age group.

Methods: The files of 78 patients over the age of 65 who were administered intra-articular methylprednisolone injection with the diagnosis of primary gonarthrosis between 2018 and 2020 were analyzed retrospectively. Age, gender, and affected side of the patients were recorded. The number of outpatient clinic admissions, VAS and WOMAC scores before and after injection were evaluated statistically.

Results: 18 of the patients were male (24.7%) and 55 were female (75.3%). The mean age was 74.95±7.11 years. WOMAC and VAS score values of the patients at the first and third months were significantly lower than the pre-injection period. The decrease in the number of outpatient visits in the 6-month period after the injection compared to the number of outpatient visits in the 6-month period before the injection was statistically significant. A strong positive correlation was found between the number of outpatient visits before injection and the first VAS score.

Conclusions: In geriatric patients with advanced-stage knee osteoarthritis who do not accept total knee arthroplasty, intra-articular methylprednisolone injection may be a feasible method that reduces pain and the number of outpatient clinic visits in the short term.

Key words: Knee Osteoarthritis, Steroids, Injection, Gonarthrosis, Geriatric Patient.

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Corresponding Author:

Ali Yüce, Health Sciences University, Başakşehir Çam ve Sakura City Hospital, Department of Orthopedics and Traumatology, İstanbul, Turkey
E-mail: dr_aliyuce@hotmail.com



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INTRODUCTION

Osteoarthritis (OA) is the most common joint disease in the world and is the leading cause of chronic musculoskeletal pain. In general, symptomatic OA can be seen in up to 40% of individuals over the age of 65 in the general population (1). Approximately 10% of men and 13% of women over the age of 60 are affected by osteoarthritic knee (2).

Surgical treatment is preferred in patients with advanced-stage degeneration (3). Although arthroplasty is an effective treatment option for pain and dysfunction associated with late stage osteoarthritis, this procedure may not be suitable for all patients due to comorbidities, lack of social support, or other factors (4).

The goals of conservative treatment of this disease are: slowing the progression of the disease, increasing functional capacity, and relieving symptoms (5). Conservative methods are generally preferred in the early stages of OA. Intra-articular injections are one of the conservative methods that can positively affect pain and functional status in gonarthrosis (3,6). On the other hand, long-term injections may cause cartilage damage and worsening of gonarthrosis (7). For this reason, although the clinical benefits of corticosteroids are not clear, methylprednisolone may be the most effective molecule among corticosteroids in symptomatic relief of knee osteoarthritis (8).

Our hypothesis is that in patients with advanced knee osteoarthritis in the geriatric age group, intra-articular methylprednisolone injection is an effective treatment method that reduces pain and the number of outpatient clinic visits. Therefore, we aimed to investigate the effect of intra-articular steroid injection on pain and functional outcomes and the number of outpatient clinic admissions in patients over 65 years of age with advanced-stage OA who do not accept arthroplasty treatment.

MATERIALS AND METHODS

This study was approved by the local ethics committee of University of Health Sciences, Okmeydanı Training and Research Hospital (Date: 24.09.2019, No: 1439), and the study was conducted according to the Declaration of Helsinki 1975.

The files of 78 patients who received intra-articular methylprednisolone injection with the diagnosis of gonarthrosis between 2018 and 2020 were retrospectively analyzed. Patients under 65 years of age, those with a history of surgery in the injected knee, those with rheumatic diseases, isolated patellofemoral pain, a history of injection in the last 6 months, osteoarthritis after a fracture, infection at the injection site, and systemic infection were excluded from the study. Four patients without follow-up and one patient who developed osteoarthritis after a fracture were excluded and 73 patients over 65 years of age with a diagnosis of primary gonarthrosis were included in the study.

Anteroposterior and lateral knee radiographs and patella tangential radiographs of the cases were evaluated. Patients with stage 4 OA according to the Kellgren-Lawrence classification on radiographs were included in the study (Table 1) (5, 9). All of the cases were patients who did not accept total knee arthroplasty due to comorbidities or social reasons.

Table 1: The stages of radiological arthrosis according to the Kellgren-Lawrence classification

Stage	Degree of osteoarthritis	Radiographic findings
Stage 1	Suspicious	Minimal osteophyte, significance uncertain
Stage 2	Minimal	Prominent osteophyte, joint space intact
Stage 3	Moderate	Moderate narrowing of the joint space
Stage 4	Severe	Severe narrowing of the joint space, sclerosis in subchondral bones

With the assistance of a physician, all patients were asked to fill the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale and the visual analogue scale (VAS) before intra-articular injection and at 4, 8 and 12th weeks of follow-up (10,11). The visual analog scale value was recorded by the patients as the amount of knee pain during walking and resting on a 10-mm-sized 1 to 10 scale (5). While calculating the WOMAC score, patients were asked to fill in three subscales (1-severity of pain during various positions or movements, 2-severity of joint stiffness, and 3-difficulty in performing daily functional

activities). The total WOMAC score was then calculated using the formula (total score x100)/96.

Intra-articular knee injections were done by the same orthopedist. After the patients were seated on a stretcher, the feet were dropped down and the knee was sterilized. When the knee joint was at 90 degrees, 1 ml of 2% prilocaine HCL with 1 ml 40 mg/mL methylprednisolone acetate combination was applied into the knee through the patella and the lateral of the patellar tendon junction under sterile conditions. Immobilization was not recommended after the injection, and patients were followed up with the recommendation of nonsteroidal anti-inflammatory drugs.

Patients' age, gender, affected side, pre-injection VAS and WOMAC scores, VAS and WOMAC scores at 1, 3 and 6 months after the injection, and the number of referrals to the outpatient clinic with complaints of gonarthrosis in the 6 months before and after the injection were recorded. The data obtained were evaluated statistically.

Statistical Analysis

Normality of the data was tested with the Shapiro Wilk test. Student t test was used to compare normally distributed variables between two independent groups, and Mann Whitney U test was used to compare non-normally distributed variables between two independent groups. Normally distributed variables in two dependent groups were examined with the paired t test. Normally distributed variables in repeated measurements were examined with repeated-measures ANOVA test and Bonferroni correction test was used as the post hoc test. Numerical variables were expressed as mean \pm standard deviation and categorical variables were expressed as number and % values. SPSS Windows version 23.0 package program was used for statistical analysis and $p < 0.05$ was considered statistically significant in all analyses.

RESULTS

18 of the patients were male (24.7%) and 55 were female (75.3%). The mean age was 74.95 ± 7.11 years. 37 injections were done on the right knee (50.7%), and 36 on the left knee (49.3%). WOMAC and VAS scores at the 1st and 3rd months of follow-up were significantly lower compared to the pre-injection values (Table 2).

Table 2: VAS and WOMAC scores of the patients before injection and at 1st, 3rd, and 6th months after injection

	median	mean \pm sd	min-max	tp
Initial VAS	6	6.00 \pm 1.72	3-10	<0.001
Month 1 VAS	3	2.93 \pm 1.99	0-9	
Month 3 VAS	5	4.52 \pm 1.72	0-8	
Month 6 VAS	6	6.11 \pm 1.78	3-10	
Initial-month 1 $\#p$	<0.001			
Initial-month 3 $\#p$	<0.001			
Initial-month 6 $\#p$	0.999			
Initial WOMAC	64	65.70 \pm 9.13	48-88	<0.001
Month 1 WOMAC	33	33.45 \pm 8.93	17-53	
Month 3 WOMAC	50	49.53 \pm 10.04	31-72	
Month 6 WOMAC	65	65.48 \pm 8.05	50-85	
Initial-month 1 $\#p$	<0.001			
Initial-month 3 $\#p$	<0.001			
Initial-month 6 $\#p$	0.983			

tp Repeated measures ANOVA test $\#p$ post hoc test,*p:Paired t test

The decrease in the number of outpatient visits in the 6-month period after the injection compared to the number of outpatient visits in the 6-month period before the injection was statistically significant ($p < 0.001$) (Table 3).

Table 3: Number of outpatient clinic visits before and after injection

	median	mean±sd	min-max	†p
Number of outpatient clinic visits before injection	5	5.34±1.77	1-9	
Number of outpatient clinic visits after injection	3	3.12±1.76	0-7	
*p	<0.001			

†p Repeated measures ANOVA test ‡ppost hoc test,*p:Paired t test

An analysis was carried out with the hypothesis that gender may have an effect on pain perception and thus on the results of the scores. No statistically significant relationship was found between gender and pre-injection VAS score, pre-injection WOMAC score, and the number of outpatient clinic visits before and after the injection (Table 4).

Table 4: Relationship between gender, VAS and WOMAC scores, and number of outpatient clinic visits

Variables	Male (n=18) M (mean±sd)	Female (n=55) M (mean±sd)	p*
Initial VAS score	5 (5.39 ± 1.33)	6 (6.2 ± 1.79)	0.082
Initial WOMAC score	66 (65.83 ± 8.38)	64 (65.65 ± 9.44)	0.943
Number of outpatient clinic visits before injection	4.5 (4.89 ± 1.78)	6 (5.49 ± 1.75)	0.211
Number of outpatient clinic visits after injection	3 (2.61 ± 1.5)	3 (3.29 ± 1.81)	0.155

p* value was obtained from student t test

A strong positive correlation was found between the initial WOMAC score and the initial VAS score (r = 0.678, P = 0.001). A strong positive correlation was found between the number of outpatient visits before injection and the initial VAS score (r = 0.633, P = 0.001) (Table 5). One patient with diabetes mellitus was admitted to the emergency room at the night of the injection due to high blood glucose levels.

Table 5: Correlation between number of outpatient visits, pre-injection VAS score and pre-injection WOMAC score

		Initial VAS score	Initial WOMAC score
Initial WOMAC score	r	0.678**	
	p	0.001	
Number of outpatient clinic visits before injection	r	0.633**	0.378**
	p	0.001	0.001
Number of outpatient clinic visits after injection	r	0.337**	0.325**
	p	0.004	0.005

r: Pearson’s correlation coefficient, (n=73), ** The correlation coefficient is significant at

p < 0.01,* The correlation coefficient is significant at p < 0.05.

DISCUSSION

Primary OA is a common disease of the knee with unknown cause, unpredictable prognosis and a high morbidity rate and that may lead to disability (5). It causes chronic pain, limitation of movement, and angular deformities in the knee joint and depresses the patient functionally and mentally (5). Treatment methods in gonarthrosis are various, and patient education, rest, preventive measures, pharmacological treatment, physical therapy and surgical treatment methods can be used alone or together according to the stages of the disease (3). While surgical treatment is preferred in patients with advanced-stage degeneration, conservative methods are preferred in the early stages. Intra-articular injections positively affect pain and functional status in gonarthrosis (3). The median age of our patient group was older compared to the

general OA population (12). This population constitutes the different aspect of our study. At the same time, intra-articular steroid injection may be an effective treatment method for short-term follow-up in geriatric cases with advanced OA.

Uğur et al. compared intra-articular hyaluronic acid and methyl prednisolone injections in patients with gonarthrosis and reported that the functional results of methylprednisolone applications were better in the short-term, but further long-term studies were required. In the same study, they observed more significant improvements in 1st and 3rd month WOMAC scores in the steroid administered group. They attributed this observation to the effectiveness of intra-articularly administered steroid in suppressing inflammation (13). A meta-analysis confirmed the short-term pain relief effect of intra-articular corticosteroid therapy in knee OA patients. The study noted short-term benefits for up to 2 weeks after injection, and also reported some long-term benefits for up to 16-24 weeks (14,15). Our study may support the findings indicating that intra-articular corticosteroid injection provides similar effects in the elderly population with advanced-stage OA.

In general, conservative treatments for knee OA are largely ineffective; only a minority of eligible patients considers arthroplasty and high tibial osteotomy in the long term (16). Practically, this suggests that a patient with moderate or severe knee OA pain or disability who fails to respond to conservative treatment may choose to delay arthroplasty for decades (16). Recently, the search for new treatment modalities in patients that do not respond to conventional treatment methods, who do not accept surgery or has comorbidities has begun to gain traction in the literature (17). Intra-articular steroid use creates cost efficiency in the short term (18). Moreover, intra-articular steroid injections may cause a decrease in the number of outpatient clinic visits in patients with advanced knee OA. We believe that this may be beneficial in reducing the workload of outpatient clinics caused by geriatric OA patients in institutions that provide healthcare services based on a social state policy as in Turkey.

Intraarticular injections are available for the elderly and advanced gonarthrosis groups. Although the expectation of functional recovery is limited in patients who do not accept surgical treatment, these injections can be safely

applied as a palliative treatment in terms of pain (5). In the present study, there was a correlation between pre-injection WOMAC scores and the number of outpatient clinic visits and pre-injection VAS scores. We believe that this may be the direct outcome of pain. There is a pain component in WOMAC scoring, and at the same time, the number of outpatient clinic visits may be related to ongoing pain complaints. The significant reduction in pain caused by intra-articular methylprednisolone injection may have led to a decrease in both scorings and the need for hospital admission.

In the present study, methylprednisolone acetate and prilocaine HCL were used in combination. Methylprednisolone acetate (MP) has a long-lasting effect and has been recommended for intra-articular injections (8). Prilocaine is a fast and short-acting local anesthetic drug, and it facilitates pain reduction and spread of the steroid agent into the joint via the volume effect (3).

Clinical and epidemiological studies have found that inflammation in the knee joints of people with knee osteoarthritis is common and is associated with the progression of cartilage damage (7). This suggests that suppression of inflammatory processes by corticosteroids (already in widespread clinical use for knee osteoarthritis) may reduce the progression of knee osteoarthritis (7). However, repeated intra-articular injections of corticosteroids may also be associated with progressive cartilage damage, and injections are not recommended to be made with intervals of less than 3 months (19). On the other hand, in the advanced age group with end stage OA, advanced cartilage damage has already occurred and we believe that intra-articular corticosteroid injections may be applied within 3-month periods in this age group.

Although complications of intraarticular corticosteroid therapy are rare, the most frequently reported adverse effects include skin atrophy at the injection site, facial flushing, and post-injection exacerbation. Systemic side effects such as infection, increased blood glucose, hypercortisolism, and others are rarely seen, but precautions such as careful planning and wearing gloves should be taken to avoid them (15). In the present study, the procedure caused an increase in blood glucose level in only one patient. However, it should be kept in mind that intra-articular injections are invasive procedures, and the possibility of complications will increase with repeated injections.

There are certain limitations of the present study. The retrospective design of the study is one of the limitations. Furthermore, the efficacy of the procedure could not be revealed by comparing the study group with patients who underwent arthroplasty and/or received other intra-articular injection agents. The data obtained included a single injection and short follow-up period, and the long-term cost-effectiveness and complication rates were unknown. In addition, the patients used non-steroid anti-inflammatory drugs during follow-up (as it may have affected the results in the short-term follow-up).

In geriatric patients with advanced-stage knee osteoarthritis who do not accept total knee arthroplasty, intra-articular methylprednisolone injection may be a feasible method that reduces pain and the number of outpatient clinic visits in the short term.

Declarations

The authors received no financial support for the research and/or authorship of this article. There is no conflict of interest.

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REFERENCES

- Çeliker R. Kalça ve diz osteoartriti tedavisinde güncel kılavuzlar. Hacettepe Tıp Dergisi 2008;39(1):36-44
- Borkar S, Bhise S, Raghute S, Thosar S, Godbole S. Clinical outcome of single intra articular injection of triamcinolone acetate depot preparation on knee osteoarthritis. Int J Orthop Sci 2018; 4(4): 161-3
- Bayrak A, Bayrak SK, Duramaz A, Sahan C, Büyükhatipoğlu A, Aslantaş FÇ. Evre 3-4 Gonartrozlu Hastalarda Diz İçi Steroid Enjeksiyonun Etkinliği. Bakırköy Tıp Dergisi 2018;14:372-76
- Desai M, Bentley A, Keck WA, Haag T, Taylor RS, Dakin H. Cooled radiofrequency ablation of the genicular nerves for chronic pain due to osteoarthritis of the knee: a costeffectiveness analysis based on trial data. BMC Musculoskelet Disord 2019; 20:302
- Keser S, Bayar A, Tuncay İ, Ege A, Demirel N. Osteoartriti Dizlerde İntraartiküler Hyaluronik Asit Enjeksiyon Sonuçları. Romatizma 2004;19(3):173-7
- Khan M, Bhandari M. Cochrane in CORR®: Intra-articular Corticosteroid For Knee Osteoarthritis. Clin Orthop Relat Res 2018; 476:1391-2
- McAlindon TE, LaValley MP, Harvey WF, Price LL, Driban JB, Zhang M, Ward RJ. Effect of Intra-articular triamcinolone vs saline on knee cartilage volume and pain in patients with knee osteoarthritis: A randomized clinical trial. Jama. 2017; 317:1967-75
- Issin A, Koçkara N, Çamurcu İY. Comparison of efficacy of intraarticular polyacrylamide hydrogel and methylprednisolone acetate in patients with knee osteoarthritis. Cukurova Med J 2018;43(1):124-128
- Kellgren JH, Lawrence JS. Radiological assessment of osteo-arthrosis. Ann Rheum Dis 1957;16:494-502
- Downie WW, Leatham PA, Rhind VM, Pickup ME, Wright V. The visual analogue scale in the assessment of grip strength. Ann Rheum Dis 1978; 37:382-4
- Collins NJ, Misra D, Felson DT, Crossley KM. Measures of knee function: International Knee Documentation Committee (IKDC) Subjective Knee Evaluation Form, Knee Injury and Osteoarthritis Outcome Score (KOOS), Knee Injury and Osteoarthritis Outcome Score Physical Function Short Form (KOOS-PS), Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL), Lysholm Knee Scoring Scale, Oxford Knee Score (OKS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Activity Rating Scale (ARS), and Tegner Activity Score (TAS). Arthritis Care Res 2011;63(11):208-28
- Losina E, Weinstein AM, Reichmann WM, Burbine SA, Solomon DH, Daigle ME, et al. Lifetime risk and age at diagnosis of symptomatic knee osteoarthritis in the US. Arthritis Care Res 2013;65:703-11
- Uğur M, Tuğuş A, Melikoğlu MA, Yıldırım K, Şenel K. Diz dejeneratif osteoartritli hastalarda intraartiküler hyalüronik asit ile intraartiküler metil prednizolon asetatın etkinliklerinin karşılaştırılması. Eurasian J Med 2007;39:185-8
- Arroll B, Goodyear-Smith F. Corticosteroid injections for osteoarthritis of the knee: meta-analysis. BMJ 2004;328:869-70
- Law TY, Nguyen C, Frank RM, Rosas S, McCormick F. Current concepts on the use of corticosteroid injections for knee osteoarthritis. Phys Sportsmed, 2015;43(3):269-73
- London NJ, Miller LE, Block JE. Clinical and economic consequences of the treatment gap in knee osteoarthritis Management. Med Hypotheses 2011;76(6): 887-92
- Sarı S, Özlülerden P, Aydın ON, Turan Y, Kurt İ, Efe U. Kronik diz osteoartriti geniküler sinirine radyofrekans termokoagülasyonu: Yeni bir alternatif tedavi için bir pilot çalışma. Turk J Phys Med Rehab 2016;62(3):234-9
- Pasquale MK, Louder AM, Cheung RY, Reiners AT, Mardekian J, Sanchez RJ, et al. Healthcare Utilization and Costs of Knee or Hip Replacements versus Pain-Relief Injections. Am Health Drug Benefits 2015; 8(7): 384-94
- Orak MM, Ak D, Midi A, B Laçın B, Purisa S, et al. Sağlıklı şıçanlarda intra-artiküler tenoksikam, diklofenak ve metilprednizolon kullanımının kronik etkilerinin karşılaştırılması. Acta Orthop Traumatol Turc 2015;49(4):438-46