# Treatment of Hallux Valgus with Hyaluronic Acid: A Pilot Study

## Halluks Valgus Tedavisinde Hyaluronik Asit Enjeksiyonu: Pilot Çalışma

Hyaluronic Acid for Hallux Valgus

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**Özet**

Amaç: Halluks valgus, birinci metatarsofalangeal (MTF) eklemde görülen başparmağın abdüksiyonu ve varus rotasyonu ile karakterize, birinci metatars başının mediyale yönlendiği bir deformitedir. Hyaluronik asit, eklemlerin dejeneratif hastalıklarında başarıyla kullanılan bir tedavi yöntemidir. Bu çalışmada, hyaluronik asitin halluks valguslu hastalar üzerine etkinliğinin araştırılması planlanmıştır. Gereç ve Yöntem: Bu pilot çalışmaya hafif ve orta halluks valgusu olan 11 kadın ve 2 erkek hasta alınmıştır. MTF ekleme birer haftalık intervallerle 3 kez 1 cc hyaluronik asit enjekte edilmiştir. Hastaların visuel analog skala (VAS) skoru, ağrısız yürüme mesafesi ve süresi, günlük analjezik ihtiyaçları kaydedildi. Sonlanım ölçütleri çalışmanın başında ve çalışmadan sonra birinci ve üçüncü aylarda değerlendirildi. Bulgular: Ortalama VAS skoru 83.08±4.58 idi. Enjeksiyondan bir ay sonra VAS skorlarının anlamlı olarak azaldığı tespit edildi (30±4.38, P:0.001). Ayrıca yürüme süresi ve mesafesinde artış, günlük analjezik ihtiyacında da birinci ay kontrolünde anlamlı düzelmeler mevcuttu (P:0.001). Üçüncü aydaki kontrollerde sonlanım ölçütlerindeki kazanımların anlamlı olarak sebat ettiği gözlendi.

**Anahtar Kelimeler**

Halluks Valgus; Hyaluronik Asit; Osteoartrit

**Abstract**

Aim: Hallux valgus is the deformity of the first metatarsophalangeal (MTP) joint with abduction and valgus rotation of the great toe, combined with a medially prominent first metatarsal head. Hyaluronic acid injection has been used in the treatment of degenerative disorders of several joints successfully. In this research, we aimed to investigate the effectiveness of hyaluronic acid injection in patients with hallux valgus. Material and Method: Eleven female and two male patients with hallux valgus were included in this pilot study. Only patients with mild and moderate hallux valgus were included in the study. 1 cc hyaluronic acid was injected into the affected MTP joint three times, at one-week intervals. Visual analogue scale(VAS) score, walking time without pain, walking distance, and daily analgesic needs of the patients were recorded. All clinical outcomes were assessed before, and then one and three months after the first injection. Results:The mean VAS score was 83.08±4.58. One month after the first injection, VAS scores of patients had decreased significantly (30±4.38, P: 0.001). Also, increased walking time and distance and decreased daily analgesic need were observed at the first month of postinjection follow-up (P: 0.001). After 3 months, the positive outcomes remained significant compared to preinjection evaluations. Discussion: According to our preliminary results, we suggest thathyaluronic acid injectionsmay be effective in reducing pain and increasing walking time and distance in patients with hallux valgus.Future studies are needed to clarify the beneficial effects of hyaluronic acid injection in patients with hallux valgus.

**Keywords**

Hallux Valgus; Hyaluronic Acid; Osteoarthritis

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## Introduction

Hallux valgus deformity is one of the most common foot problems seen by clinicians. It is defined as a deformity at the first metatarsophalangeal (MTP) joint with abduction and valgus rotation of the great toe, combined with a medially prominent first metatarsal head [1]. The etiology can be related to occupational, genetic, and extrinsic factors. Heredity seems to be the major predisposing factor with up to 68% of patients showing a familial tendency [2].Extrinsic factors, such as wearing high-heeled shoes may also be important in the development of hallux valgus [3].Although nonsurgical approaches have been recommended as the first treatment choice, there are a few conservative treatment alternatives for patients with hallux valgus deformity [4].The source of pain in patients with hallux valgus may be the peripheral soft tissue or secondary degenerative changes in the joint.

Hyaluronic acid injection has been used in the treatment of degenerative disorders of several joints successfully [5-7].However, to the best of our knowledge, there are no trials concerning the effects of hyaluronic acid injections in hallux valgus. Therefore, in this research, we aimed to investigate the effectiveness of hyaluronic acid injection in patients with hallux valgus by carrying out a pilot study.

## Material and Method

Eleven female and two male consecutive patients with hallux valgus were recruitedbetween July and November 2007. All the subjects gave their informed consent prior to their inclusion in the study.The principles outlined in the Declaration of Helsinki were followed.Weight-bearing anteroposterior radiographs of both feet were obtained from each patient to assess the hallux valgus angle (HVA) and the intermetatarsal angle (IMA). The HVA is formed by the intersection of the longitudinal axes of the proximal phalanx and the first metatarsal,and the IMA is formed by the intersection of the longitudinal axes of the first and second metatarsals (Figures 1-2) [8].The severity of the deformity was classified using the following radiological criteria: normal (HVA<15°, IMA<10°); mild (HVA 15 to 20°, IMA 10 to 14°); moderate (HVA 20° to 40°, IMA 15° to 20°), and severe (HVA>40°; IMA>20°) [9].Using this classification, the grading of hallux valgus by radiographs was performed by the same experienced researcher. Patients with mild and moderate hallux valgus were included in this study. Patients were excluded if they had severe hallux valgus, hallux rigidus or any other foot deformities,orsystemic or neuropathic disorders that affect the foot and ankle such as rheumatoid arthritis, gout, or polyneuropathy. Patients taking anticoagulant or analgesic drugs and patients whohad a previous intra-articular injection inthe affected MTP joint were also excluded from the study. The contraindications for the injections were infection or inflammation of the joint, skin disease or skin infection at the injection site, pregnancy, and related hypersensitivities.

A 25-gauge needle was used to inject1.2 million dalton weight 1 cc hyaluronic acid (sodium hyaluronat) into the affectedMTP joints three times, at one-week intervals. All hyaluronic acid injections were applied inthe first MTP joint using the standard dorsal approach by the same physician [10].No analgesic was allowed except paracetamol (maximum 2000 mg/day) during

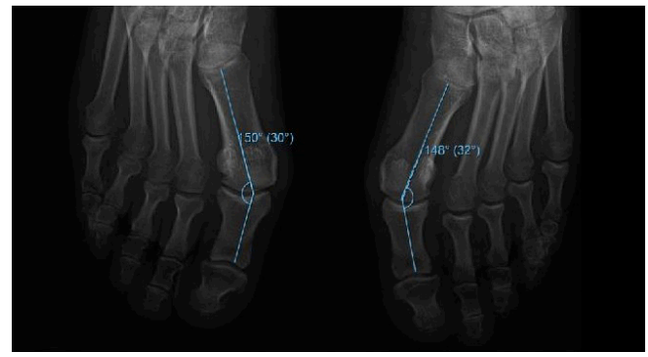


Figure 1. Hallux valgus angle

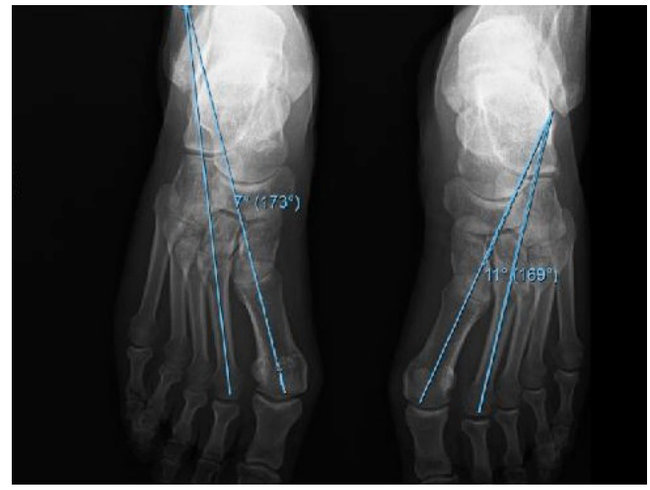


Figure 2. Intermetatarsal angle

the study. Paracetamol use was stopped 8 hours before the clinical evaluations. For clinical evaluation, VAS score, walking time without pain (minutes), walking distance (the number of blocks that can be walked without pain), and daily analgesic needs of the patients were recorded. All clinical outcomes of the patients were assessed before, and then one and three months after the first injection by a differentresearcher.

The statistical analysis was performed using the SPSS 11.0 for Windows program. The clinical outcomes of the patients were analyzed using the Wilcoxon Signed Ranks Test. P<0.05 was considered as being statistically significant.

## Results

All patients completed the study. Systemic or local adverse effects did not occur during or shortly after intra-articular injection. The mean age of the patients was 49.69±1.15 years and mean disease duration was 5.08 ±0.30 years. The mean hallux valgus angle was 29.230 (min:160, max:400) and mean intermetatarsal angle was 13.080 (min:100, max:170). In three patients, hallux valgus was in the mild form,whereas moderate form was determined in ten patients. One month after the first hyaluronic acid injection, VAS scores and the amount of daily analgesic needs of patients were found to be significantly decreased (P:0.001) (Table1). Also, increased walking time and distance were observed at the first month of postinjection follow-up (P: 0.001). After 3 months, the positive outcomesfor the patients remained significant compared to preinjection evaluations (P: 0.001). No statistical difference was determined between the first and third monthassessments.

Table 1. Comparison of preinjection values of pain, walking time without pain, walking distance without pain and amount of daily analgesic need to first and third months' postinjection values.

| | Before hyaluronic acid injection | 1 month after the first hyaluronic acid injection | 3 months after the first hyaluronic acid injection | P (preinjection-postinjection 1 month) | P (preinjection-postinjection 3 month) |
|---|---|---|---|---|---|
| VAS | 83.08 ± 4.58 | 30 ± 4.38 | 20.71 ± 4.15 | 0.001 | 0.001 |
| Walking time without pain (minutes) | 3.15 . ± 1.61 | 36.69 ± 10.75 | 35.77 ± 11.12 | 0.001 | 0.001 |
| Walking distance without pain (blocks) | 2.23 ± 0.469 | 4.08 ± 0.400 | 4.85 ± 0.337 | 0.001 | 0.001 |
| Amount of daily analgesic need (paracetamol mg) | 1040±105,5 | 385±83 | 155 ±66,5 | 0.001 | 0.001 |

Abbreviations: VAS: visual analog scale; mg: miligram

## Discussion

Although hallux valgus is a frequently seen musculoskeletal disorder in general, its treatment protocolhas not yet been clarified. A consensus has not been reached on several surgical techniques and their rates of success [11,12].Conservative treatment options which are widely preferred, are limited. In our study, VAS values and daily analgesic needs of patients decreased and walking distance and walking time increased significantly one month after the hyaluronic acid injection. There were no significant differences between the first and third months' mean values of walking time and distance after injection, reflecting unchanged positive effects of administration. Also, since these findings are similar after three months of the hyaluronic acid delivery,the possibility of a placebo effect is minimized.Similar to our results, several studiesoffirst metatarsophalangeal joint osteoarthritishave reported that HA injections resulted in statistically significant reductions in patients'symptoms [13,14].Pons et al. compared the effectiveness of HAand triamcinolone injections in first metatarsophalangeal joint osteoarthritis in 37 patients, and found that both treatments were successfulin terms of pain at rest or with palpation and pain on passive mobilization, without any significant differences between groups [13].Petrella et al. [14] assessed the efficacy of HA injections into the first MTP joint in golfers toe patients who reported osteoarthritis-associated pain, loss of MTP joint ROM, and disability that interfered with golf participation. They reported that HA injection was significantly effective for pain tolerance[14].However, the results of thethesestudies could not be confirmed by placebo-controlled randomized trials.

The source of pain in patients with hallux valgus has not been clearly determined. Peripheral soft tissue or articular reasons are possible pain sources. Stephens has defined a degenerative process with erosions in the pathogenesis of hallux valgus [15]. The tissue damage in the medial line of the MTP joint and erosion in the head of metatarsal and medial or lateral sesamoid bones can be seen even in the early stage of the disorder. The deformation can be initiated with the loss of the cartilage in the head of metatars. Erosion in the MTF joint was determined in studies on patients and cadavers with hallux valgus [16]. Also it has been reported that any disorder resulting in first MTP joint inflammation may weaken MTP soft tissue restraints, predisposing to bunion formation [17].In a study thatevaluated 265 patients with hallux valgus, cartilage degeneration was reported in 73.2% of the patients and a significant correlation between the grade of this degeneration and hallux valgus angle was determined [18]. These results of clinical and histopathological studies suggestthat hallux valgus might be considered as a degenerative disorder which can affect the MTP joint and peripheral soft tissue with a process similar to osteoarthritis. Our observational study which indicated the effectiveness of hyaluronic acid in patients with hallux valgus may also support these results. The positive effect of hyaluronic acid in patients with hallux valgus may be the results of its analgesic, anti-inflammatory, and viscoelastic features [5-7].Because of frequent recurrences, high complication rates, and the ineffective results of surgical interventions which have been reported, new conservative treatment alternatives are needed [19].

The main weakness of our study is the limited number of patients, the absence of a control group, and the absence of a specific evaluation method to ratethe functioning of the first toe. Because of these important limitations, our results should be carefully considered.

### *Conclusions*

Despite several important limitations, based onour results, we believethat hyaluronic acid injection may be an effectiveconservative therapy choice for the treatment of hallux valgus.Future controlled studies with larger sample sizesand control groupsare needed to clarify the beneficial effects of hyaluronic acid injection in patients with hallux valgus.

### *Competing interests*

The authors declare that they have no competing interests.

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