

Radiographic Measurements Associated with the Natural Progression of the Hallux Valgus Deformity during at Least Two Years of Follow-up

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Introduction/Purpose: There have been few longitudinal studies regarding hallux valgus deformity. This retrospective study aimed to investigate the radiographic measurements associated with the progression of hallux valgus deformity during at least two years of follow-up.

Methods: Seventy adult patients (mean age, 58.0 years; standard deviation [SD], 12.3 years; 13 males and 57 females) with hallux valgus who were followed-up for at least two years and underwent weight-bearing foot radiography were included. Radiographic measurements included the hallux valgus angle (HVA), hallux interphalangeal angle, intermetatarsal angle (IMA), metatarsus adductus angle, distal metatarsal articular angle (DMAA), tibial sesamoid position, anteroposterior (AP) talo-first metatarsal angle, and lateral talo-first metatarsal angle. Progression of hallux valgus deformity was defined as an increase of 5 degrees or more in the HVA during follow-up. Patients were divided into progressive and non-progressive groups. Binary logistic regression analysis was performed to identify factors that significantly affect the progression of hallux valgus deformity. The correlation between change in HVA and changes in other radiographic indices during follow-up was analyzed.

Results: Eighteen out of 70 patients showed progression of 5 degrees or more in the HVA during the mean follow-up of 47.0 months (SD, 19.8 months). The DMAA ($p=0.027$) and AP talo-first metatarsal angle ($p=0.034$) at initial presentation were found to be significant factors affecting the progression of hallux valgus deformity. Change in the HVA during follow-up was significantly correlated with changes in the IMA ($r=0.423$; $p=0.001$) and DMAA ($r=0.541$; $p<0.001$).

Conclusion: Special attention needs to be given to patients with pes planovalgus and increased DMAA during follow-up. Change in HVA was significantly correlated with changes in IMA and DMAA. Therefore, progression of hallux valgus deformity is considered to be closely related to the progressive instability of the first tarsometatarsal joint.

Table 1. Data summary.

Parameter	Progressive group	Non-progressive group	p-value
No. of subjects	18	52	-
Age at initial visit (years)	63.9 (9.7)	55.9 (12.7)	0.029
Male : Female	4 : 14	9 : 43	0.728
Right : Left	8 : 10	27 : 25	0.785
Follow-up duration (months)	54.0 (25.6)	46.4 (18.3)	0.297
Initial radiographs			
HVA	28.9 (7.6)	24.0 (5.8)	0.010
HIA	6.7 (5.8)	10.4 (5.6)	0.033
IMA	12.4 (3.4)	11.3 (3.0)	0.258
MAA	21.6 (4.4)	20.5 (4.9)	0.462
DMAA	30.6 (12.6)	21.6 (9.7)	0.005
Tibial sesamoid position (Gr 0/1/2/3)	1 / 4 / 5 / 8	5 / 9 / 25 / 13	0.334
AP talo-1 st metatarsal angle	13.6 (7.5)	7.9 (6.7)	0.011
Lateral talo-1 st metatarsal angle	6.3 (6.7)	6.1 (6.2)	0.894
Final radiographs			
HVA	36.8 (7.7)	25.4 (6.1)	<0.001
HIA	6.1 (6.4)	9.5 (6.4)	0.078
IMA	14.6 (2.9)	11.7 (2.9)	0.003
MAA	22.7 (4.9)	20.5 (4.3)	0.108
DMAA	37.2 (11.6)	23.6 (10.3)	0.002
Tibial sesamoid position	0 / 1 / 4 / 13	4 / 7 / 16 / 25	0.273
AP talo-1 st metatarsal angle	12.3 (7.4)	8.6 (5.8)	0.081
Lateral talo-1 st metatarsal angle	7.9 (7.6)	8.3 (6.8)	0.864

Continuous variables are presented as mean (SD).

HVA, hallux valgus angle; HIA, hallux interphalangeal angle; IMA, intermetatarsal angle; MAA, metatarsus adductus angle; DMAA, distal metatarsal articular angle; AP, anteroposterior.