Natural Progression of Radiographic Indices in Juvenile Hallux Valgus Deformity
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Introduction/Purpose: There is a lack of quantitative studies on the progression of juvenile hallux valgus deformity. Therefore, we performed this study to estimate an annual change of radiographic indices for juvenile hallux valgus.

Methods: We reviewed medical records of consecutive patients under the age of 15 with juvenile hallux valgus who underwent weight-bearing foot radiographs more than twice, and were followed over a period of one year or more. A total of 133 feet from 69 patients were included. Hallux valgus angle, hallux interphalangeal angle, intermetatarsal angle, metatarsus adductus angle, distal metatarsal articular angle, anteroposterior talo-1st metatarsal angle, anteroposterior talo-2nd metatarsal angle, and lateral talo-1st metatarsal angle were measured and were used as a study criteria. The progression rate of hallux valgus angle was adjusted by multiple factors including the use of a linear mixed model with gender and radiographic measurements as the fixed effects and laterality and each subject as the random effect.

Results: Our results demonstrate that the value of hallux valgus angle on the radiographs progressed as the patients grew older. The hallux valgus angle increased by 0.8° per year (p<0.001) (Figure). The distal metatarsal articular angle also increased by 0.8 per year (p=0.003). Conversely, hallux interphalangeal angle decreased by 0.2° per year (p=0.019). Progression of the intermetatarsal angle and metatarsus adductus angle with aging were not statistically significant. There was a difference in progression of radiographic indices between older patients (=10 years) and younger patients (<10 years). The hallux valgus angle increased by 1.5° per year (p<0.001) in younger patients, progression of the hallux valgus angle in older patients was not statistically significant (p=0.869) as children grew up.

Conclusion: These results suggest that the hallux valgus angle increased in patients with juvenile hallux valgus under 10 years old, unlike the patients aged 10 or older. We believed that our results can help surgeons to determine a treatment strategy that uses the growth potential to achieve correction of deformity such as lateral hemiepiphyseodesis of the 1st metatarsal to patients with juvenile hallux valgus.