

# **Surgical Treatment of Dynamic Valgus in Patients with Fibular Hemimelia: A Radiographic Assessment**

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## **What was the question?**

Can dynamic valgus in patients with fibular hemimelia be predicted by a radiographic finding? How do the radiographic measurements change with and after surgical treatment of dynamic valgus in patients with fibular hemimelia? Are age, follow-up time and/or a synostosis/tether related to recurrence in patients with fibular hemimelia who've undergone surgery for dynamic valgus?

## **How did you answer the question?**

A retrospective study was conducted on patients with fibular hemimelia who underwent shortening tibial osteoplasty between January 2014 and February 2022. Patients were excluded who had less than 2 years of follow-up, bilateral involvement, fixed valgus deformity, previous rotationplasty, or were skeletally mature at the time of surgery. Radiographic measurements included: lateral distal tibial angle (LDTA), talocrural angle (TCA), anterior distal tibial angle (ADTA), and distal fibular station (DFS). Measurements were compared at preoperative, immediate postoperative, and final follow-up. Multivariate logistic regression was performed to determine if any of the radiologic measurements could predict dynamic valgus. Multivariate linear regression was performed to determine if age, follow-up or synostosis/tether were related to changes in DFS following surgery.

## **What are the results?**

Twenty patients met the inclusion criteria (9 females/11 males). The mean age at surgery was 6.9 years ( $\pm 3.5$  years) and mean follow-up was 4.0 years ( $\pm 1.3$  years).

Logistic regression found preoperative DFS ( $p < 0.0001$ ) to be predictive of dynamic valgus. The logistic regression model had a specificity and sensitivity of 0.90. DFS (ICC=.94) at different time points demonstrated a significant change ( $p < 0.0001$ ,  $W = 0.60$ ) with improvement from preoperative to postoperative measurements ( $p < 0.0001$ ), recurrence from postoperative to final ( $p = 0.0001$ ) and no difference between the preoperative and final values ( $p = 1.0000$ ). Findings were similar for LDTA, TCA and ADTA. The linear regression model found a synostosis/tether ( $p < 0.0001$ ) and follow-up duration ( $p = 0.0155$ ) were predictive of the recurrence of the DFS radiographic measurement. Figure 1 is the prediction plot using two groups: the group in blue had a synostosis/tether and the group in black did not. The group with the tether had less change in DFS postoperatively compared to the group without.

## **What are your conclusions?**

Distal fibular station can be used to confirm the dynamic valgus of the ankle on clinical exam. Tibial osteoplasty for shortening to re-establish the distal fibular station improves the position immediately postoperatively, but the deformity recurs. The presence of a tibial-fibular synostosis or tether may prevent this recurrence.

Predicted Change in Distal Fibular Station (DFS)

