Tibial Sesamoid Radiographic Position Mis-Match between Sesamoid Axial & Dorsal-Plantar Views

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Introduction & Purpose

Robust surgical correction of hallux valgus (HV) deformity is associated with adequate reduction of the Tibial Sesamoid position underneath the first metatarsal head[1]. Traditionally, the first metatarsal bone is relocated laterally to be placed over the sesamoids during HV corrective surgery, in the belief that hallux valgus leads to subluxation of the first metatarsal from the sesamoids. However, in recent years, this traditional theory has been challenged in terms of how to reduce the sesamoid position relative to the first metatarsal[2,3,4,5].

Regardless of which theory is true, investigators would agree that the accurate and reproduceable measurement of the sesamoid position is critical to assessing the deformity and it correction. This work hypothesizes that both the AP View and Sesamoid Axial views (see **Figure 1**) for assessment of the Tibial Sesamoid position yields the same result and can be used inter-changeably for clinical evaluation, even when significant lateral deviation of the Tibial Sesamoid is present.

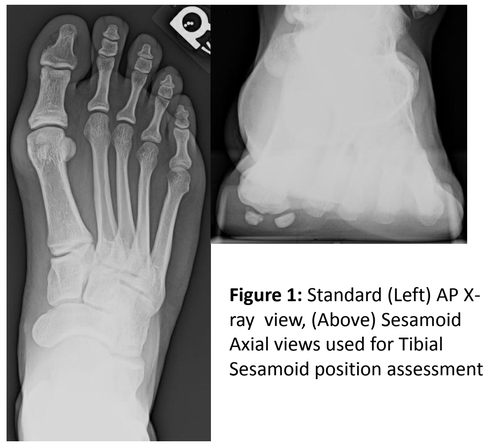


Figure 1: Standard (Left) AP X-ray view, (Above) Sesamoid Axial views used for Tibial Sesamoid position assessment

The purpose of this study is to explore if Tibial sesamoid position yields the same results when using either AP or Sesamoid Axial radiographic views.

Methods

Patient Demographics	
Total Number of Patients Enrolled:	114
Female Patients:	76
Male Patients:	56
Average Age of Patients:	56 ± 14.0

Figure 2: Patient demographics

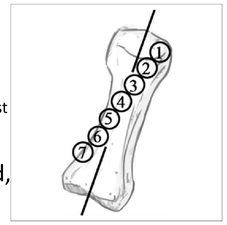
In order to characterize Tibial Sesamoid position, patient data was collected at Baylor Scott & White after obtaining proper IRB approval, Patient Demographics detailed in **Figure 2**.

Weight bearing x-rays were screened to identify sets of x-rays that included dorsoplantar (AP) and sesamoid axial views. These x-rays were then screened for inclusion and exclusion criteria as follows:

1. Patients had to be between the ages of 18-80
2. Patients could have no history of previous osseous trauma or surgery
3. If a patient had multiple sets of x-rays that qualified for all of the above criteria, only the most recent set of x-rays was included for analysis
4. If patient had bilateral x-rays available, only one set of x-rays were allow per patient.

AP Tibial Sesamoid Position

Measurement based on the longitudinal bisection of the 1st metatarsal and the relative position of the Tibial Sesamoid, see figure to the right.



Sesamoid Axial – Tibial Sesamoid Position

Measurement based on the perpendicular bisection of the 1st metatarsal head through the crista, with corresponding scores matching the relative positions defined in AP Tibial Sesamoid Positioning.

Analysis/Results & Discussion

Data was parsed and compared using paired Student t-tests once underlying assumptions regarding normal distribution, variance, and independence confirmed.

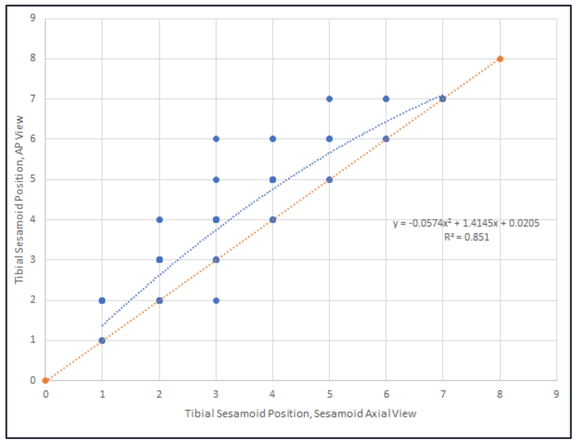


Figure 3: Demonstrates no linear relationship between the AP and sesamoid axial view positions.

Seen in **Figure 3** are the regression model used for the demonstrating a non-linear behavior noting in the data. If the two radiographic views produces the same measured position for the Tibial sesamoid, all data points would lie along the linear yellow line. Paired Student t-test demonstrates that the two data groups did not have a linear relationship (p-value <0.0001).

The most extreme range of data ioccurred at sesamoid axial position 3, where it was noted that AP data ranged from 3 to 6.

Tibial Sesamoid position is measured to be significantly increased (p-value <0.0001) in lateral deviation when using AP x-ray views as opposed to Tibial Sesamoid x-ray views.

Conclusion & References

Tibial sesamoid position is a positional measure that has been used in qualifying commonly encountered forefoot deformities, such as hallux abductovalgus. This work demonstrates that the use of AP and Sesamoid Axial x-rays views are not interchangeable. Instead, use of the AP view can exaggerate the Tibial sesamoid position that would be determined from a Sesamoid Axial view x-ray.

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