Assessment of Atavistic Cuneiform Traits in Patients with Pathologic Bunions

Matthew Schmidt, DPM; David Eastman, DPM; Jennifer Sweet, DPM, FACFAS; Angela Freeman, DPM, AACFAS

United Health Services Hospitals

Statement of Purpose

Obliquity of the first metatarsal-medial cuneiform joint, commonly referred to as an atavistic cuneiform, has long been argued in its role in bunion deformity. The aim of this study is to assess atavistic cuneiform traits on patients in whom bunion procedures have been performed.

Methods and Procedures

Radiographs of 197 feet on whom a bunion procedure was performed from 6 different surgeons from 1/4/18-5/10/19 were analyzed retrospectively. Preoperative intermetatarsal, Engel's, and first metatarsal-medial cuneiform obliquity (Figure 1 & 2) angles were measured and type of procedure performed recorded. All radiographs were taken from highly trained radiology technicians with experience in foot and ankle. Pearson Correlation Coefficients statistical analysis was performed for relationship of variables and significance.

Figure 1

Figure 2

Figure 1. First metatarsal-medial cuneiform obliquity with greater measured angle
Figure 2. First metatarsal-medial cuneiform obliquity with lesser measured angle

*No financial disclosures this case study

Literature Review

Published literature provides conflicting evidence on whether atavistic cuneiform truly exist and if it plays a significant role in hallux abducto valgus deformities. Patel et al (1) found no correlation between the intermetatarsal angle and the first metatarsal-medial cuneiform obliquity angle. We set out to use the same guidelines of measurements established by Patel et al since no standardized radiographic definition of medial cuneiform obliquity has been established. Dayton et al (2) and Hatch et al (3) used different definitions of measurements for cuneiform obliquity but found differing evidence. Dayton et al found a positive relationship between preop intermetatarsal angle and cuneiform obliquity though it was not statistically significant while Hatch et al found no correlation with bunion deformities. Others (4,5) have suggested differences in the medial cuneiform obliquity angle in radiographic appearance based on positioning.

Procedure	Amount Performed
Distal Metatarsal Osteotomy	96
Silver	10
First Metatarsophalangeal Fusion	13
SERI Bunionectomy	15
Akin Osteotomy	2
Lapidus	59
Closing Base Wedge Osteotomy	1
Opening Base Wedge Osteotomy	1

Table 1. Distribution of procedure performed

Angle	Mean	Standard Deviation
PreOP Intermetatarsal	13.51	3.41
PreOP Engel's	21.29	5.33
PreOP Cuneiform Obliquity	18.02	5.29

Table 2. Average preoperative measurements

Results

A total of 197 feet were reviewed. Distribution of procedures performed are shown in Table 1 . First metatarsal-medial cuneiform obliquity angle averaged 18.02; Preoperative intermetatarsal angle averaged 13.51; with correlation coefficient of 0.4791 (P value <0.0001) between the two. Average Engel's angle of 21.29 with a -0.1318 correlation (P value 0.0648) to first metatarsal-medial cuneiform obliquity angle (Tables 2 and 3). The medial cuneiform obliquity angle was also found to have a significant correlation coefficient of 0.19546 (P value 0.0059) with Lapidus bunionectomy as the chosen procedure, as seen in Table 4.

	PreOP Intermetatarsal	PreOP Engle's
PreOP Cuneiform Obliquity Correlation Coefficient (P Value)	0.4791 (<.0001)	-0.13184 (<.0648)

Table 3. Correlation between preoperative intermetatarsal and Engle's angle to cuneiform obliquity angle

Procedure	Medial cuneiform obliquity angle correlation coefficient (P Value)
Lapidus	0.19546 (0.0059)

Table 4. Correlation between medial cuneiform obliquity angle and a lapidus procedure performed

Analysis and Discussion

A statistically significant correlation was found between preoperative intermetatarsal angle and first metatarsal-medial cuneiform obliquity angle. We also found there to be a negative correlation between Engel's angle and first metatarsal-medial cuneiform obliquity angle, suggesting it is not associated with metatarsus adductus alone. We noticed that with our 6 providers, a larger first metatarsal-medial cuneiform obliquity angle lead to greater likelihood of performing a Lapidus procedure. There have been many studies performed investigating this relationship. We set to find a correlation in those patients who have a pathologic bunion thereby requiring surgical intervention. We believe these results further add to the debate of atavistic cuneiform having a role in bunion deformity development.

References

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