Clinical Utility of the Medial Oblique Image to Assess Lateral Deviation Angle in Patients With Symptomatic Tailor's Bunion Deformity

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STATEMENT OF PURPOSE

- Lateral bowing of the fifth metatarsal is typically seen on the medial oblique (MO) view which we feel is more pronounced in patients with tailor's bunion deformity **(figure 1).**
- The apex of angular deformity is frequently more apparent on the MO view which can help determine the precise location for corrective osteotomy **(figure 2).**
- We routinely rely on the MO view for preoperative, intraoperative and postoperative assessment **(figure 3),** yet the clinical utility of this approach has not been previously reported.
- The purpose of this study is to determine the clinical relevance of measuring the lateral deviation angle (LDA) on the MO view in tailor's bunion deformity.

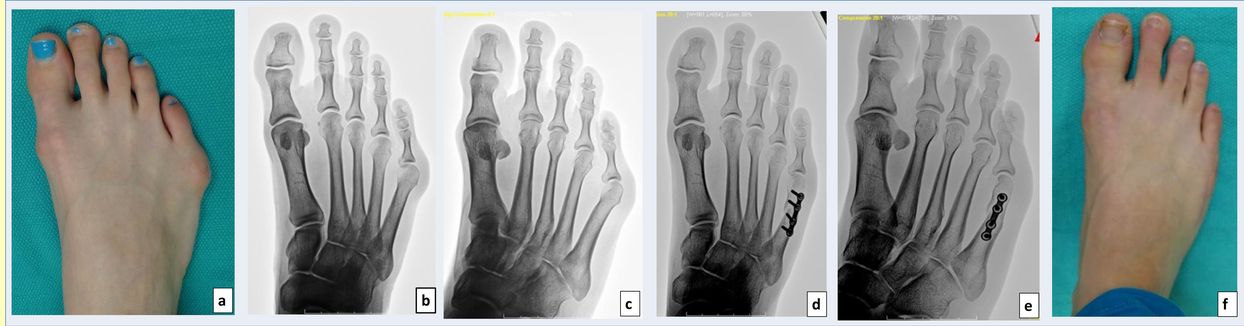
LITERATURE REVIEW

- Fallat and Buckholz described measuring the angles associated with tailor's bunion deformity to account for the lateral bowing as well as the fourth-fifth intermetatarsal angle (4th-5th IMA) [1]. Reported measurement techniques and classification system utilize the AP view only.
- Lee in 2011 compared radiographic alignment and morphology of the fifth metatarsal in stress fracture cases versus a control. This is the only study to our knowledge that compared radiographic measurements in the AP view and the MO view for fifth metatarsal pathology. The authors concluded that the extent of fifth metatarsal curvature on a 30-degree MO view was found to be more related to the risk of fracture than on the AP view [2]. The literature is lacking in studies that use the MO view to analyze normal and pathologic fifth metatarsal morphology.
- DeSandis in 2016 compared CT and x-ray analysis of fifth metatarsal morphology. They found a mean x-ray MO LDA of 5.3^{O} in their study of 241 patients without a history of fifth metatarsal pathology [3].
- Weil discusses the importance of understanding possible fifth metatarsal head plantarflexion in tailor's bunion deformity. Clinical findings such as a plantar keratosis may benefit from a procedure that elevates the metatarsal head along with angular correction. He advocated for procedure selection that would allow for dorsal as well as medial translation to render a more favorable position of the fifth metatarsal [4,5].

METHODS

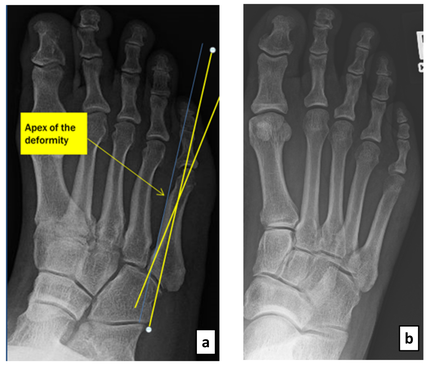
- 50 patients with symptomatic tailor's bunion deformity were retrospectively reviewed with a mean age of 54.6 yrs. (22-76 yrs.): 10 male and 40 female. Inclusion criteria included patients over the age of 18 with standing radiographs without any history of forefoot surgery.
- 50 patients without clinical evidence of a tailor's bunion were selected as controls with a mean age of 52.0 (22-76 yrs.): 11 male, 39 female.
- Lateral deviation angle was measured on standing AP and 30 degree MO views using technique described by Fallat and Buckholz **(figure 4).**

Figure 1. Is fifth metatarsal lateral bowing on the medial oblique (MO) view clinically relevant or normal plantar declination?



(a) Preoperative clinical appearance of severe tailor's bunion deformity yet (b) minimal lateral bowing of the fifth metatarsal is appreciated on the AP view. (c) The MO view allows better appreciation of lateral bowing with midshaft apex of deformity. (d,e) Correction of lateral bowing was confirmed on both AP and MO views following midshaft osteotomy with (f) clinical resolution of deformity. Our goal with corrective osteotomy is a straight metatarsal on both AP and MO imaging.

Figure 2. Assessing MO and AP Views for Apex of Tailor's Bunion Deformity

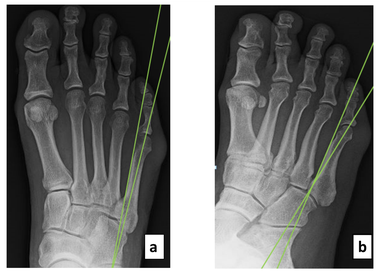


(a) Apex of plantar-lateral deformity of the fifth metatarsal is frequently easier to see on the MO view as compared to the (b) AP view.

Figure 3. Using the Medial Oblique (MO) View for Surgical Planning

(a) Apex of metatarsal deformity is observed on pre-op MO view which guided location of oblique osteotomy and complete correction of angular deformity as seen on the (b) intra-op MO view. (c) Complete correction of deformity is confirmed on the post-op MO view.

Figure 4. LDA Measurement Technique



(a) LDA measurements in AP and (b) MO views. The distal line bisects the neck and head of the fifth metatarsal, and the proximal line is draw adjacent and parallel to the medial proximal aspect of the fifth metatarsal shaft.

Table 1. LDA Measurement Results

	Mean AP LDA (range)	Mean MO LDA (range)	Mean Image Diff. (range)
Symptomatic group	2.14^{o} (0-13^{o})	8.60^{o} (3-18^{o})	6.46^{o} (1-14^{o})
Control group	0.30^{o} (0-10^{o})	4.32^{o} (1-12^{o})	4.04^{o} (1-11^{o})
p-value	$p < 0.001$	$p < 0.001$	$p < 0.001$

RESULTS

- In the symptomatic tailor's bunion group, the mean AP LDA was 2.14^{O} (0-10^{O}), and the mean MO LDA was 8.6^{O} (3-18^{O}). The mean difference of LDA angle measurement between the AP and MO views was 6.46^{O} (1-14^{O}) **(table 1).**
- In the control group, the mean AP LDA was 0.3^{O} (0-2^{O}), and the mean MO LDA was 4.32^{O} (3-18^{O}). The mean difference of LDA angle measurement between the AP and MO views was 4.04^{O} (1-11^{O}).
- Significant differences were found between the two groups with respect to the fifth metatarsal LDA on AP as well as MO views. Comparing the results between the two groups, the mean AP LDA was 1.84^{O} greater in the symptomatic tailor's bunion group ($p < 0.001$). The mean MO LDA was 4.28^{O} greater in the symptomatic tailor's bunion group ($p < 0.001$). Statistical analysis calculated using T-test for two independent means.

ANALYSIS & DISCUSSION

- Limited literature is available on this topic but Lee found a higher correlation to fifth metatarsal stress fractures on the MO view compared to the AP view [2]. DeSandis found a mean MO LDA of 5.3^{O} in their study of 241 patients without a history of fifth metatarsal pathology [3], which is similar to our finding of a mean MO LDA of 4.3^{O} in our control group.
- Current methods of radiographic analysis, as well as classification of tailor's bunion deformity utilize the AP view.
- Lateral deviation as seen on the MO view has not been studied yet we identified that the LDA on the MO view in the tailor's bunion group was almost twice the degree seen in the control group.
- The ability to fully appreciate pathologic curvature of the fifth metatarsal in Tailor's bunion deformity allows more precise localization of apex of deformity which has implications for corrective osteotomy. These findings should be confirmed through higher level research.

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