

Quantitative Lesser Trochanter Versus Cortical Step Sign in Assessing Femoral Malrotation After Femoral Nailing

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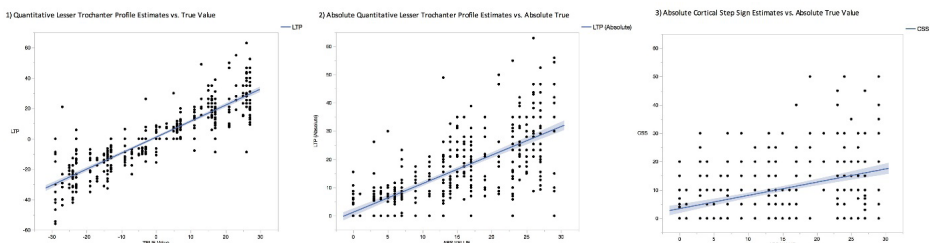
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Purpose: A technique that uses the relative sizes of the lesser trochanters to calculate the direction and magnitude of femoral malrotation after IM nailing has been recently described ("Quantitative Lesser Trochanter"), and we hypothesized that this technique would provide a better estimate of rotation than the previously described "Cortical Step Sign" technique.

Method: A transverse mid shaft osteotomy was performed on 11 cadaveric femora, a reamed IM nail placed, and a jig allowed for rotation of the proximal femur. Images were obtained of the proximal femurs and the osteotomy site at rotations of 0° and at random magnitudes of both internal and external rotation. A computer-based quiz was made from a random order of the 77 images of the proximal femur and 77 images of the osteotomy site. Six orthopaedic traumatology attendings or fellows who were blinded to the magnitude of malrotations estimated the amount and direction of malrotation using the "Cortical Step Sign" technique and to perform 3 measurements of the lesser trochanter size. Malrotation was then calculated based on a novel formula previously described (malrotation = $70 \times (\text{difference in lesser trochanter size} / \text{maximum lesser trochanter size})$). Reliability was calculated using intraclass correlation coefficients (ICCs). The mean absolute difference between the true value and each measurement technique were compared using paired t tests.

Results: The ICC for the Quantitative Lesser Trochanter technique was 0.83 vs. 0.51 in the Cortical Step Sign technique ($P < 0.01$). The Quantitative Lesser Trochanter estimates also demonstrated a stronger correlation (0.74) to the true values compared to the Cortical Step Sign technique (0.40). The mean difference between the absolute Quantitative Lesser Trochanter measurements and true value was 6.7° (95% confidence interval [CI]: 6.0-7.3) which was clinically similar to the 9.0° (95% CI: 8.3-9.7) using the Cortical Step Sign technique ($P < 0.0001$).

Conclusion: The Quantitative Lesser Trochanter technique may provide an improvement in measurement accuracy ($P < 0.0001$) and reliability (ICC: 0.83 vs 0.51) compared to the Cortical Step Sign technique. Furthermore, the Quantitative Lesser Trochanter technique provides an additional advantage over Cortical Step Sign in that the direction of the malrotation is calculated.



See pages 401 - 442 for financial disclosure information.