

CT Improves Assessment of the Morphology of Lateral Wall for AO/OTA 31A1 and 31A2 Fractures and May Prevent Failures of Sliding Hip Screws

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Purpose: Our objective was to compare the assessment accuracy of “lateral wall” integrity of intertrochanteric (IT) AO/OTA 31A1 and 31A2 femur fractures using plain radiographs versus CT and determine predictive factors of fixation failures.

Methods: We retrospectively reviewed 142 patients with IT fractures treated with a sliding hip screw (SHS) or a cephalomedullary nail (CMN). All patients had preoperative plain radiographs, a CT scan, and at least 6 weeks of postoperative follow-up. The thickness of the lateral wall (LWT) was measured on plain radiographs using previously described methodology. We developed new CT-based measurements to assess the size and shape of the lateral wall including: the average axial wall thickness (AWT) and average axial wall size (AWS). Tip-apex difference (TAD) was also measured. Implant-related failures were defined as: iatrogenic lateral wall fractures, varus collapse with cut-out, or symptomatic shortening of the fracture that required treatment. Statistical analysis was performed with significance set at $P < 0.05$.

Results: 105 patients were treated with a CMN and 37 with an SHS. There were no differences in patient demographics or TAD. We found a poor correlation between plain radiographic measurements and CT measurements ($r^2 = 0.14$ for AWT and 0.28 for AWS). 15 patients had implant failure (6 CMN, 9 SHS). There were no statistically significant associations between any measurements and CMN failures (4 shortened, 2 superior cut-out, 1 nonunion). However, failures in the SHS group (2 shortened, 3 varus collapse with cut-out, 4 lateral wall fracture) were significantly associated with both CT measurements (AWT $P < 0.0044$, AWS $P < 0.0234$) but not with LWT radiographic measurements ($P = 0.66$).

Conclusion: Plain radiographs are not sufficient for assessing the morphology of the lateral wall for use of SHSs and are not sufficient to predict SHS implant failures. Our novel CT measurements are effective to determine which lateral wall patterns are at risk for failure when using SHS implants.