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Abstract: Femoral stem version has a major influence on impingement and early post-operative stability after total hip arthroplasty (THA). The main objective of this study was to evaluate the validity of a novel radiological method for measuring stem version. Anteroposterior (AP) radiographs and three-dimensional CT scans were obtained for 115 patients (female/male 63/72, mean age 62.5 years (50 to 75)) who had undergone minimally invasive, cementless THA. Stem version was calculated from the AP hip radiograph by rotation-based change in the projected prosthetic neck-shaft (NSA*) angle using the mathematical formula ST = arcos [tan (NSA*) / tan (135)]. We used two independent observers who repeated the analysis after a six-week interval. Radiological measurements were compared with 3D-CT measurements by an independent, blinded external institute. We found a mean difference of 1.2° (sd 6.2) between radiological and 3D-CT measurements of stem version. The correlation between the mean radiological and 3D-CT stem torsion was r = 0.88 (p = 0.94) and inter-observer agreement (mean concordance correlation coefficient = 0.87) for the radiological measurements were excellent. We found that femoral tilt was associated with the mean radiological measurement error (r = 0.22, p = 0.02). The projected neck-shaft angle
is a reliable method for measuring stem version on AP radiographs of the hip after a THA. However, a highly standardised radiological technique is required for its precise measurement.