Abstract:
The use of surgical navigation to aid in total joint replacement requires the bony fixation of reference marker arrays. In this context, a number of potential complications have been reported, including pin-site infection, soft tissue morbidity, and stress fracture. This study was performed to determine whether a femoral pinless, imageless navigation method for total hip arthroplasty (THA) is an accurate alternative method of measuring leg-length and offset change intraoperatively. Computer-assisted THA was simulated on a Sawbones bench test model including a femoral soft tissue model. Leg-length and offset changes were calculated by an imageless navigation system using the pinless measurement algorithm, in which the calculation of leg-length and offset changes is based on a specific realignment of the leg and then compared to corresponding measurements on a millimeter scale at the level of the femoral condyles. Mean difference in leg-length measurement (navigation versus millimeter paper) was 0.9 mm (95% confidence interval [CI]: 0.03-1.7 mm, P=.043), and the corresponding mean difference in offset was 1 mm (95% CI: 0.06-1.9 mm, P=.038). A noninvasive, pinless femoral system is a reliable tool for controlling leg length and offset during THA in an in-vitro setup. This system could lead to a reduction of potential risks associated
with navigation techniques.

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