

Received: 24 March 2020 | Revised: 24 June 2020 | Accepted: 8 July 2020

DOI: 10.1002/rcs.2141

ORIGINAL ARTICLE

The International Journal of Medical Robotics and Computer Assisted Surgery | WILEY

Precision and accuracy of robot-assisted technology with simplified express femoral workflow in measuring leg length and offset in total hip arthroplasty

Andrea Cozzi Lepri^{1,2} | Marco Villano^{1,2} | Matteo Innocenti^{1,2} | Tommaso Porciatti^{1,2} | Fabrizio Matassi^{1,2} | Roberto Civinini^{1,2}¹Orthopedic Unit, Department of Health Sciences, University of Florence, Firenze, Italy²C.T.O., Firenze, Italy

Correspondence

Andrea Cozzi Lepri, Orthopaedic Unit, Department of Health Sciences, University of Florence, Firenze, Italy.
Email: andrea84@gmail.com

Abstract

Background: Semi-active robot-assisted total hip arthroplasty (THA) has two options to measure the leg length discrepancy (LLD) and combined offset (CO), the 'enhanced' femoral workflow and the so-called 'express' simplified workflow. The purpose of this study was to determine the precision and accuracy of intraoperative LLD and CO measurement with express workflow robotic THA.

Methods: Between February 2018 and December 2019, 30 patients underwent an express workflow robot-assisted primary THA for intraoperative LLD and CO measurements. Postoperative radiographs were used for LLD and CO measurement. In order to examine the accuracy of the robotic system assessment, the absolute difference between the robotic assessments and radiographic evaluations was calculated.

Results: Intraoperative robotic measurements reported a mean error of 0.2–0.6 mm for each registration, with no significant difference between them ($p = 0.311$). The average absolute discrepancies between the robotic and radiographic assessments in the LLD and CO measurements were 1.3 ± 1.5 mm ($p = 0.17$) and 1.1 ± 0.9 mm ($p = 0.11$), respectively, while the Pearson's correlation coefficients were 0.69 and 0.71.

Conclusions: An external marker without a femoral array inserted into a screw positioned in the greater trochanter would be an easier and faster method to measure LLD and CO. Our study showed that the measured values of LLD and CO obtained by intraoperative express workflow robot-assisted THA system were precise and accurate.

KEYWORDS

combined offset, express femoral workflow, leg length discrepancy, robot-assisted technology, total hip arthroplasty