TOTAL KNEE ARTHROPLASTY RSA IN THE STANDING LOW-DOSE BIPLANAR EOS X-RAY IMAGER

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ORTHOPAEDICS

BACKGROUND: The low radiation biplanar X-ray EOS Imager scans patients in a weight-bearing position, provides calibrated three-dimensional information on bony anatomy, and could limit the radiation during serial RSA studies. This pilot study was initiated to determine the double exam precision from radiostereometric analysis (RSA) of total knee arthroplasty (TKA) patients in the EOS.

METHODS: At a mean of 3.9 years post-surgery, 9 TKA participants (mean 67 years, 7 female, 2 male) were scanned twice in the EOS imager. To reduce motion, a support for the foot was added, the scan speed was increased, and a calibration object was included.

RESULTS: The 95% confidence interval precision was 0.09, 0.04, and 0.11mm in the x, y, and z planes, respectively and 0.17, 0.07, and 0.07° in R_x, R_y, and R_z. One participant at a faster speed had motion artifacts which were successfully removed with post-processing using the calibration object.

CONCLUSION: With faster speeds and additional stabilization support, this pilot study suggests an *in vivo* RSA precision of ≤ 0.11mm and $\leq 0.17°$, well within published uniplanar values for arthroplasty RSA, with the benefit of greater precision in the z-plane that a biplanar setup offers, weight bearing imaging, and a lower radiation dose.