CT-RSA is a novel tool to evaluate implant migration. Harmonization in image acquisition might improve precision.

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Introduction

CT-RSA is a novel alternative to conventional RSA for measuring implant migration. Different settings regarding image reconstruction affect image quality and therefore might affect measurement precision in CT-RSA. In addition, a follow-up CT could be formatted with settings differing from those of the postoperative CT (baseline). We aimed to investigate this by measuring double exam precision.

Methods

Postoperative double examinations were acquired in ten patients undergoing uncemented revision THA. All studies were performed on a SOMATOM Drive scanner (Siemens Healthineers, Erlangen, Germany). The estimated average effective dose for each scan was 0.3 mSv. Reconstruction series were obtained for each scan; metal artifact reduction (no or yes), kernel/convolution algorithm (soft, Br32, or sharp, Br59), and field of view (unilateral, 200 mm, or bilateral, individualized).

Analysis was performed in CTMA (Sectra, Sweden). For statistics 95% precision estimates with T-distribution was used. The outcome measure was the precision for total rotation,

Results

Figure 1 presents the upper 95% confidence interval for measurement precision with the various settings, and when mixing different settings. Differences in measurement precision ranged from 0.3 to 0.4 degrees. Two of the mixed analyses indicated increased precision estimates.

Discussion and Conclusion

Differences in CT settings appear to have acceptable effects on CT-RSA measurement precision in uncemented revision cups, as indicated in this small cohort. Out of the three variations, a mix of soft and sharp kernel resulted in the largest loss in precision. When several factors were varied simultaneously a more pronounced negative effect was seen.