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Short knee radiographs in the evaluation of coronal alignment after total knee arthroplasty

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Background: Standardized postoperative short knee radiographs serve as documentation and surgeon performance feedback following total knee arthroplasty. Controversy regarding the relationship between alignment measurements on postoperative and full-length radiographs are evident both scientifically and during daily conference with participation of non-knee surgeons. Measurement of mechanical coronal knee alignment from standing full-length lower-limb radiographs is gold standard, alignment in the range from 177-183 is considered neutral.

Purpose / Aim of Study: To examine relationship between coronal plane implant alignment measured from postoperative and follow-up full-length radiographs.

Materials and Methods: Retrospective study on a consecutive cohort. Measurements of alignment using TraumaCad™ guides. Examination of intra- and inter-rater reliability of the measurements, and agreement between short knee radiographs and full-length radiographs, with intraclass correlation coefficient. Evaluation of clinical relevance from Bland Altman analysis and sensitivity analysis.

Findings / Results: 138 cases were included. Intra- and inter-rater reliability of the measurements was excellent, with ICC above .95. Agreement between the methods was good (ICC=.81(.74-.87)). Mean mechanical tibiofemoral alignment from full-length radiographs (mTFA) = 179 ± 2.9 degrees. Mean anatomical tibiofemoral alignment from the knee radiographs (aTFA) = 185 ± 2.6 degrees. Mean difference between methods = 5.8 (CI 5.4-6.1) and 95% limits of agreement 1.4 to 10 degrees. Censoring of suboptimal projections and very short films only improved the results slightly. 32 full-length radiographs and 35 postoperative showed malalignment. Positive predictive value of a postoperative knee radiograph with malalignment was 54% and negative predictive value was 87%.

Conclusions: Good agreement between the methods might justify the cautious use of short film anatomical angulations as surrogate measurement of alignment. Clinicians should be aware of the wide limits of agreement and predictive power when evaluating postoperative TKA radiographs.