

ASSESSING CORONAL LOWER LIMB ALIGNMENT IN THE SETTING OF KNEE ARTHROPLASTY: A COMPARISON OF WEIGHTBEARING LONG LIMB RADIOGRAPHS WITH INTRAOPERATIVE DEFORMITY ANALYSIS VIA THE MAKO ROBOT

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Coronal alignment of the lower limb has long been considered a critical element in the success and survivorship of knee arthroplasty. Weightbearing long limb alignment radiographs (LLA) have been used as the gold standard for coronal plane deformity analysis and pre-operative planning of knee arthroplasty. However this mode of imaging is prone to inaccuracy due to technician error and patient compliance during imaging. Robotic arm assisted knee arthroplasty utilises stress loaded real time deformity analysis performed by the surgeon responsible for interpreting and utilising the data.

This study aimed to evaluate the correlation between the two methods in assessing coronal plane alignment.

Methodology:

Patients undergoing Mako partial (PKA) and total (TKA) knee arthroplasty were identified from our hospital database. The hospital PACS system was used to identify and measure coronal plane alignment of patients that had preoperative weightbearing long limb alignment radiographs. This data was correlated to the intraoperative deformity analysis during MAKO robotic arm registration and planning. A further comparison was undertaken with the cohort that had only intraoperative deformity analysis

Results:

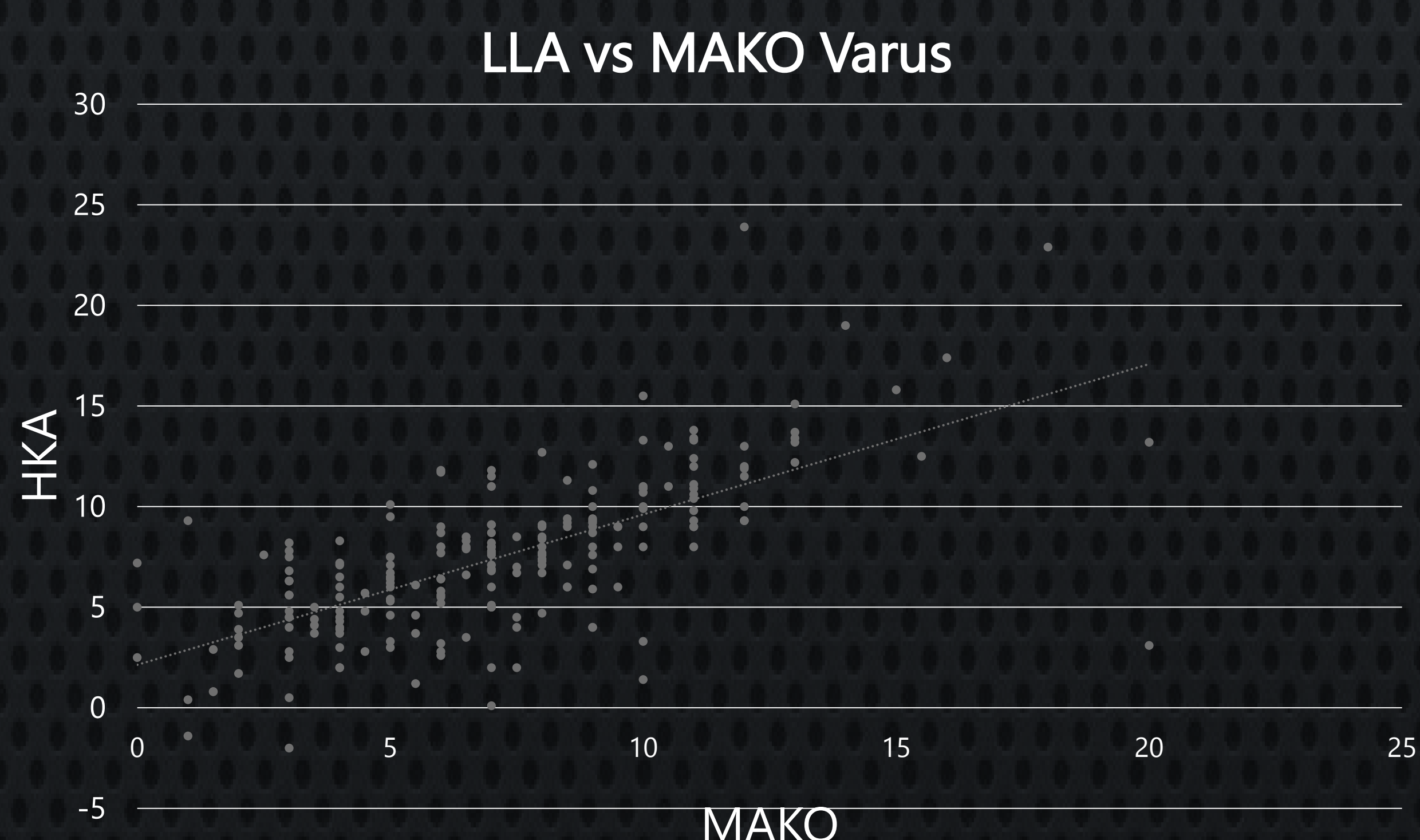
443 consecutive Mako cases (225 TKA and 218 PKA) were performed between November 2019 and December 2021 in our unit. Weightbearing long leg alignment radiographs were obtained in 247 (56%) cases. Intraoperative deformity analysis data was available for 414 (93%) patients. 378 (91%) patients demonstrated varus malalignment, 36 (9%) valgus malalignment. The mean coronal varus was 7.46° (SD 3.89) for the LLA versus 7.13° (SD 3.56) for the RDA, with a moderate correlation, $R= 0.50$, $p<0.0001$. The mean valgus in this cohort was 6.44° (SD 4.68) for LLA versus 4.75° (SD 3.79) for RDA, with no significant correlation $R= 0.18$, $p=0.38$. The subset without pre-operative LLA radiographs showed no significant difference in mean varus (6.49°, SD 2.99), or valgus (2.94°, SD 2.46), compared to the principal group, $p=0.61$. The trend within our unit was to undertake fewer LLA radiographs as familiarity and uptake of robotic assisted surgery increased.

There were no adverse events or errors in malalignment utilising robotic arm assisted arthroplasty in any subgroup within this study.

Conclusion:

Intraoperative analysis appears to provide satisfactory and comparable accuracy to long leg alignment radiographs. It would suggest that preoperative weightbearing long leg alignment radiographs may be unnecessary for routine patient assessment when undertaking robotic arm assisted knee arthroplasty.

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Graph: Correlation between long leg alignment film measured varus compared to intraoperative MAKO SmartRobotics assessment