BACKGROUND

Minimal Joint Space Width (mJSW, defined as the narrowest point of the tibio-femoral joint), and Anatomical Axis Angle (AAA, the angle formed by the lines bisecting the femur and the tibia as they intersect at the center of the tibial spine tips on plain radiographs of the knee can be used to evaluate the severity and progression of knee osteoarthritis. These measurements are therefore useful in determining subject eligibility and safety in clinical trials for osteoarthritis treatment. To be practical for clinical trials, an efficient, accurate and precise measurement system is required which also features the QC tool for Inter-margin-distance (IMD).

OBJECTIVE

To evaluate a new semi-automated knee joint analysis tool to measure mJSW, AAA and IMD for use in clinical trials.

METHODS

Both mJSW and AAA were automatically calculated with minimal user interactions (Figure 1 and 2), while IMD was measured using a built-in caliper. Both mJSW and AAA were measured on AP knee radiographs from 30 subjects, by two experienced users, to assess inter- and intra-observer reproducibility. The Mean (and SD) value of absolute difference in each measurement was computed. IMD precision was not evaluated in this study.

RESULTS

Table 1 and 2 show both the intra- and inter-observer intraclass correlation coefficient (ICC) values as well as repeatability coefficients (RCs) for medial mJSW, lateral mJSW, and AAA.

mJSW

The intra-observer reproducibility of mJSW ranged from 0.95 to 0.99 for ICC and 0.36 to 0.64 mm for RC. The inter-observer reproducibility of mJSW ranged from 0.85 to 0.98 for ICC and 0.59 to 1.33 mm for RC.

AAA

The intra-observer ICC of AAA were 0.95 and 0.97 for observer A and B, respectively. The inter-observer ICC of AAA were 0.85 and 0.92 for session 1 and 2, respectively. The RCs ranged from 1.54° to 3.04°.

CONCLUSION

The analysis tool presented here provided good intra- and inter-observer reproducibility. The constraints aided in the user a rapid identification of location and reproducible landmarks. This comprehensive semi-automated analysis tool is suitable for the assessment of knee joints in clinical trials.

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