In Vivo Determination of Knee Kinematics for Subjects Having a Zimmer-Biomet Persona PCR or PS TKA

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DATA ANALYSIS

Once the subjects have completed the activity, the fluoroscopic videos will be stored digitally and specific frames of interest will be captured from the video and exported into the preprocessing software. The specific frames of interested will be full extension, maximum knee flexion (both inclusive), and 30º knee flexion increments during the complete flexion cycle.

Our 3D to 2D registration technique will be used to overlay the 3D models of the implanted components on their projection in the 2D fluoroscopic image. The fluoroscopic video would be digitized into frames and corrected for distortion. From here, the distortion-free images would be used with the 3D to 2D registration technique to extract in vivo patient femorotibial kinematics, which involves overlaying the 3D models of the components on their projection in the 2D fluoroscopic image.

Statistical analysis of the data will be carried out to analyze the two cohorts. All variables, except for lift-off and VAG, will be denoted as continuous. The data will be first checked for normality using the Shapiro-Wilk test. Only when the data is found to be normally distributed will parametric tests be used; otherwise, non-parametric tests will be used. The data will also be tested for equality of variance using the Barlett's test and Levene's test. The final selection criterion for the type of test to conduct will be based on the check for normality, as well as the check for equal variance. Therefore, for all the continuous variables, the following tests will be used:

1. Student's t-test (when the data is normally distributed and has equal variance).
2. Welch Anova test (when the data is normally distributed but has unequal variance).
3. Wilcoxon Mann Whitney U-test (when the data is not normally distributed).

Lift-off, as applicable, will be treated as a categorical variable in this study and a contingency analysis using the Fisher's exact test will be carried out. All statistical tests will be carried out at 95% confidence level (α=0.05) and will be performed using JMP® Statistical DiscoveryTM (SAS Institute Inc., Cary, NC) software.