Introduction

Accurate alignment of components in total knee arthroplasty (TKA) is a known factor that contributes to improvement of post-operative kinematics of the joint, as well as to increased survivorship of the implants themselves. Recently, computer-assisted orthopaedic surgery (CAOS) has been introduced into TKA in effort to reduce positioning variability that may deviate from the mechanical axis. However, literature suggests that clinical outcomes following TKA with CAOS may not present a significant improvement from traditional methods of implantation. This would infer that achieving correct alignment, alone, may be insufficient for ensuring an optimal re-construction of the joint. Therefore, the diversity of surgeon techniques used in this 3-year, multicentric study presents a unique opportunity to evaluate the importance of soft-tissue balancing, through the quantification of joint kinetics collected with intraoperative sensors, with or without the combined use of CAOS.

Methods

Seven centers have contributed 232 patients who have undergone primary TKA with the use of intraoperative sensors. Of the 7 surgeons contributing patients to this study, 4 utilize CAOS for every case; 3 utilize manual techniques. Along with standard demographic and surgical data being collected as per the multicenter study protocol, soft-tissue release techniques and mediolateral intercompartmental loads—as indicated by the intraoperative sensors—were also captured pre- and post-release. “Optimal” balance was defined as a mediolateral load difference of ≤15 lbs, all load differences displaying >15 lbs. were considered to be “suboptimal.” Surgeons were instructed to sequentially release ligamentum, using a pie-crusting technique, until optimal loading was achieved. A chi-squared analysis was performed to determine if the percentage of soft-tissue release was significantly different between the two groups: patients with CAOS, and patients without CAOS.

Results

Of the 232 patients (36% with CAOS, 64% without CAOS) who have received TKA, using intraoperative sensors to assess mediolateral balance. 92.6% underwent soft-tissue release. Releases were performed in 95% of cases using CAOS, and 91% of patients were released using manual techniques. A chi-squared analysis—with 3 degrees of freedom; and 99% confidence—was executed to determine if the 4% difference between the two groups was significant. The analysis showed that there was no significant difference between the two groups, thus we can conclude that soft-tissue release was as equally necessary in the CAOS TKA group, as it is in the manual TKA group.

Discussion

It is widely accepted that correct alignment of TKA components contributes to improved kinematic function of the affected joint. Recently, technology has developed to digitally guide surgeons through bony cuts, thereby decreasing the incidence of deviation from the mechanical axis. However, alignment may not be the foremost contributing factor in ensuring an optimal joint state. In this study, 92.6% of the cohort required soft-tissue release to define balance. There was no statistical difference in the amount of release required in navigated and non-navigated cases. A chi-squared analysis—with 3 degrees of freedom; and 99% confidence—was executed to determine if the 4% difference between the two groups was significant. The analysis showed that there was no significant difference between the two groups, thus we can conclude that soft-tissue release was as equally necessary in the CAOS TKA group, as it is in the manual TKA group.

References

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Disclosures: Gerald Jerry, Gregory Golladay, and Jon Douchinis are paid consultants for OrthoSensor Inc. (Sunrise, FL).