



Computer-Assisted Techniques Versus Conventional Guides for Component Alignment in Total Knee Arthroplasty. A Randomized Controlled Trial.

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ABSTRACT

Background: Optimal alignment of the prosthesis in total knee arthroplasty results in improved patient outcomes. The goal of this study was to determine the most accurate technique for component alignment in total knee arthroplasty by comparing computer-assisted surgery with two conventional techniques involving use of an intramedullary guide for the femur and either an intramedullary or an extramedullary guide for the tibia.

Methods: One hundred and seven patients were randomized prior to surgery to one of three arms: computer-assisted surgery for both the femur and the tibia (the computer-assisted surgery group), intramedullary guides for both the femur and the tibia (the intramedullary guide group), and an intramedullary guide for the femur and an extramedullary guide for the tibia (the extra-medullary guide group). Measurements of alignment on hip-to-ankle radiographs and computed tomography (CT) scans made three months after surgery were evaluated. The operative times and complications were compared among the three groups.

Results: The coronal tibiofemoral angle demonstrated, on average, less malalignment in the computer-assisted surgery group (1.91°) than in the extramedullary (3.22°) and intramedullary (2.59°) groups ($p = 0.007$). The coronal tibiofemoral angle was $>3^\circ$ of varus or valgus deviation in 19% (seven) of the thirty-six patients treated with computer-assisted surgery compared with 38% (thirteen) of the thirty-four in the extramedullary guide group and 36% (thirteen) of the thirty-six in the intramedullary guide group ($p = 0.022$). The increase in accuracy with computer-assisted surgery came at a cost of increased operative time. The operative time for the computer-assisted surgery group averaged 107 minutes compared with eighty-three and eighty minutes, respectively, for the surgery with the extramedullary and intramedullary guides ($p < 0.0001$). There was no significant difference in any of the outcomes between the intramedullary and extramedullary guide groups.

Conclusions: This study provides evidence that the implant alignment with computer-assisted total knee arthroplasty, as measured with radiography and computed tomography, is significantly improved compared with that associated with conventional surgery with intramedullary or extramedullary guides. This finding adds to the body of evidence showing an improved radiographic outcome with computer-assisted surgery compared with that following conventional total knee arthroplasty. Level of Evidence: Therapeutic Level I. See Instructions to Authors for a complete description of levels of evidence.

SUMMARY

Within this trial 107 patients with varus deformities were randomly assigned to computer-assisted surgery (Brainlab navigation used), to intramedullary guides for both the femur and the tibia, or to intramedullary guide for the femur and extramedullary guide for the tibia.

Evaluated was amongst others the alignment on radiographs and CT scans three months post-operatively.

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CONCLUSION

The authors feel CAS provides the most accurate alignment of implants in TKA

“This study adds to the body of evidence demonstrating that computer-assisted total knee arthroplasty has better radiographic outcomes than conventional surgery with extramedullary and intramedullary guides.”

“[...] we suggest that computer-assisted total knee arthroplasty should be accepted as providing the most accurate alignment of implants.”

“The coronal tibiofemoral angle demonstrated, on average, less malalignment in the computer-assisted surgery group (1.91°) than in the extramedullary (3.22°) and intramedullary (2.59°) groups (p = 0.007).”