



Role of Navigation in Total Hip Arthroplasty

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ABSTRACT

Current uses of computed tomography-based and imageless navigation systems for total hip arthroplasty include proper placement of the acetabular component, measurement of limb-length changes, enablement of minimally invasive surgery, and proper placement of components for hip resurfacing procedures.

This article provides an overview of the rationale for computer-assisted surgery in total hip arthroplasty and hip resurfacing.

The experience of the senior author (M.L.S.) with computer-assisted surgery for hip arthroplasty has demonstrated improved position of the acetabular component as compared with the position attainable with use of mechanical instruments, maintenance of appropriate position of the acetabular component during minimally invasive surgery, and appropriate positioning of the femoral and acetabular components during the learning curve for hip resurfacing procedures.

SUMMARY

The authors highlight key aspects in total hip arthroplasty (THA) like cup positioning and leg length measurement. Proper cup positioning, according to this paper, not only prevents impingement and dislocation but also pelvic osteolysis, acetabular migration and implant wear.

Mechanical alignment guides show clear limitations in accurate and precise positioning of implants whereas CAS, after a learning curve, provides for decreased variability with regard to orientation of the acetabular component and increased accuracy.

CONCLUSION

Using CAS leads to more accurate positioning within the safe zone (inclination between 30° and 50°, anteversion between 5° and 25°)

“(…) recent literature has demonstrated that the percentage of acetabular components being placed in the target safe zone was higher in computer-navigated hips than in nonnavigated controls, with less variation in implant position.”

CAS improves acetabular component position and can enable minimal invasive hip surgery

“Computer-assisted surgery has contributed to reproducible and accurate positioning of hip arthroplasty implants. Computer navigation for minimally invasive approaches as well as hip resurfacing continues to evolve.”

(continued...)

Navigated THA may become standard of care

“Taking into account the economic considerations of long-term implant survivorship, computer-assisted total hip arthroplasty may become the standard of care.”

Navigation helps quantifying changes in leg length

“Postoperative limb-length inequality remains a major cause of patient dissatisfaction and litigation after hip replacement. Navigation has shown potential to help quantify intraoperative limb length and potentially reduce the risk for postoperative limb-length inequality.”

Additionally Renkawitz et al. recently “found femoral pinless leg length and offset measures reliable in conjunction with an imageless navigation technique of realignment during THA” performing a study on 18 cadaveric hips