Surgical Navigation as a Measuring Tool

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Computer-assisted navigation has become a valuable tool for orthopedic surgeons over the past decade. In contrast to the majority of previous publications that failed to show any difference in clinical outcome with the use of navigation in total knee arthroplasty (TKA), recent studies have found a clinical mid-term benefit. These encouraging results may be a turning point in the ongoing discussion of the benefits of computer-assisted navigation, but they must be supported by additional studies. The first long-term results with follow-up periods of more than 10 years are expected to be published within the next few years. Although navigation technology has improved over the past decade, results of these studies will either verify or falsify the controversial hypothesis that the survival of modern implants is correlated with implant alignment. It is probable that, based on these long-term results, the next few years will determine the fate of the use of navigation systems in TKA.

Similarly to TKA, past data do not support the hypothesis that navigated total hip arthroplasty (THA) results in a clinical benefit, and few studies regarding the clinical outcome have been published. Radiographic results demonstrate the accuracy of navigation to help the surgeon place the components in the desired position, thereby reducing complications related to malposition (eg, impingement or dislocation). However, even more so in THA than in TKA, no consensus exists regarding using navigation to determine bony landmarks or optimal component position to produce optimal results. Over the past few years, computer-assisted navigation has been introduced in anterior cruciate ligament reconstruction and high tibial osteotomy and must prove clinical efficacy during the next decade.

Besides the question of clinical efficacy, navigation systems provide a reproducibility and precision of radiographic operative results that is widely accepted. Based on this fact, navigation systems are not only used in clinical routine, but they have also become a valuable measurement tool for scientific questions. They are increasingly used to intraoperatively acquire data about axes, stability, or kinematics in THA and TKA or in anterior cruciate ligament reconstruction. The 3-dimensional analysis of joints and axes has the potential to improve the understanding of reasons for failure or success of joint replacement and reconstructive surgery. Navigation may thereby become an intraoperative diagnostic tool.

REFERENCES


