Radiologic evaluation of cup placement variation in conventional total hip arthroplasty

PURPOSE: Determination of the amount of variation in conventional acetabular cup positioning (radiological inclination and anteversion) in view of different factors that could influence the measured angles. MATERIALS AND METHODS: The intended acetabular cup position of 45 degrees inclination and 20 degrees anteversion was checked radiologically in 950 patients who received a cementless total hip replacement. The qualifications of the surgeon, operated side and implant model were recorded and analyzed with respect to a possible correlation with the results. Since a "safe angle" cannot be defined without consideration of other variables, a tolerable deviation of the target position was investigated. RESULTS: The mean inclination angle was 48.7 degrees (SD 7 degrees, minimum 28 degrees, maximum 75 degrees). Anteversion was measured with a mean of 18.6 degrees (SD 9 degrees, minimum -9 degrees, maximum 50 degrees). Assuming an acceptable deviation of +/- 5 degrees from the target position (45 degrees inclination and 20 degrees anteversion), only 22.7% of the acetabular cups were in this range. In the case of an acceptable deviation of +/- 10 degrees, 34.5% of the cups were still outside of the acceptable range. The qualifications of the surgeon, the implanted model, as well as the operated side did not have a significant influence on the results. CONCLUSION: The common
Implantation technique yielded significant variation with respect to anteversion and inclination. The application of computer-aided navigation in the placement of acetabular cups would help to improve accuracy and reproducibility considerably in total hip arthroplasty.