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Editorial

Updates in Hip Arthroplasty - Computer Aided Surgery - Does it Improve the Accuracy of Implantation?

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Editorial

Total hip replacement is one of the most successful surgical procedures of the 20th century (World Health Organization). The success rate is dependent on the chosen end point. Evaluation of the outcome in joint replacement surgery has shifted from the revision rate toward patient satisfaction and quality of life. Patient satisfaction is reported to be up to 96% 16 years postoperatively, but the prevalence of groin pain after conventional total hip replacement ranges from 0.4% to 18.3% and activity-limiting thigh pain is still an existing problem linked to the femoral component of uncemented hip replacement in up to 1.9% to 40.9% of cases in some series.

Optimal acetabular cup position is an important factor of short and long-term success of Total Hip Arthroplasties (THA). Poor cup position has been associated with impingement [1], dislocation, accelerated polyethylene wear, pelvic osteolysis, component loosening, and component migration.

There have been several studies regarding the optimal orientation of the acetabular component in THA. Lewinnek et al. [1] recommended an inclination angle of 40° ± 10° and an anteversion angle of 15° ± 10° as the safe zone for cup orientation in THA.

Methods to determine acetabular component position intraoperatively historically have consisted of free hand techniques and the use of mechanical guides. In the past decade, the accuracy of these methods has come into question. Freehand and mechanically guided techniques have resulted in inaccurate cup inclination and anteversion, with numerous cups placed outside the predefined safe zone as described by Lewinnek et al. [1]. Cup positioning using these techniques, even in the hands of experienced surgeon's leads to variations between the actual and desired implant orientation because it is difficult to know the patients exact position on the operating table. These problems have demonstrated a need to develop more reliable tools in order to prevent malpositioning of the implants and to improve the producibility of implant alignment in THA.

There is still considerable debate regarding the benefits of computer-assisted techniques in hip replacement. So far, there is a clear need for further prospective and randomized controlled trials to define or determine the role of navigation in THA.

The purpose of this recent prospective, randomized study performed at the Department of Orthopedics at the Medical University of Vienna, was to compare the accuracy of cup placement of different implantation-techniques in THA. We hypothesized that the use of an imageless hip navigation system would increase the accuracy of acetabular cup positioning within the desired position and safe zone compared with that achieved with conventional free hand implantation methods.

The results of this study, published in the Journal of Arthroplasty in April 2014 [2] demonstrated higher implantation accuracy for navigated THA, especially for the anteversion with a significant difference for the postoperative mean values, for the deviation from the target position and the percentage of outliers. This is in accordance to the recent studies showing the superiority of computer-assisted implantation in terms of accuracy. When using minimal invasive techniques the use of computer-assisted surgery seems to be a solution to the limited visibility of anatomical and marks.

Proper positioning, especially for the anteversion and the reduced outliers is not only important to prevent impingement and dislocation, but also helps to prevent the pelvic osteolysis, acetabular migration, and intercomponent polyethylene wear, that can result from vertical positioning [2]. Proper leg length correction is important in order to restore normal locomotive function, avoid limping, knee pain on the contralateral side, and low back pain and results in patient satisfaction. Thus, the higher implantation accuracy for navigated THA can be regarded as an important contribution to mid and long-term success of THA.

However, in our prospective randomized study, we could not detect a significant difference in clinical results and revision rates comparing the navigation and conventional implantation-technique, at a short-term follow-up period (range 0.15-3.5 years). This is the major limitation of our study. The clinical differences, with regard to dislocation rate, range of motion, and pain as well as wear and aseptic loosening of the implants, between patients treated with navigation and those treated with freeh and cup-placement need to be evaluated at intermediate and long-term follow-up time-periods in order to demonstrate potential benefits for hip navigation. Consecutive radiographic and clinical follow-up examinations are scheduled in our study protocol at 6 weeks, 3 and 6 months and then once a year to evaluate intermediate and long-term results for the study population.

Another limitation of our study is that we did not use the navigation for measuring the stem position and its anteversion. Therefore it was not possible to measure the combined anteversion. Combined anteversion has become more relevant with the use of non cemented implants, accordingly, there is often less ability to adjust the stem anteversion in uncemented compared to cemented stems. The correct combined anteversion ensures mating of the femoral head in the cup without impingement causing dislocation, accelerated wear and pain. Dorr et al. [3] showed that with computer navigation the

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combined anteversion was within the safe zone of 25° to 50° in 96% of the hips.

To our knowledge, this current study, comparing imageless computer-assisted with free hand implantation of cementless total hip arthroplasties, is including the largest prospective randomized sample size published at this time. However, further consecutive follow-up examinations are needed to evaluate a difference in clinical results and revision rates comparing the navigation and conventional implantation-technique in the medium and long-term.

Based on the results of the present study, we concluded that imageless hip navigation increases the accuracy of acetabular component placement within the desired position and safe zone compared with that achieved with conventional free hand implantation methods. The postoperative CT-scans revealed that the final cup position during the surgery is in agreement with the orientation planned.

In fact, the use of a navigation device, which measures the combined anteversion, performing the femur first technology is an additional tool for the surgeon to achieve an optimal acetabular cup and stem position as an important factor of short and long-term success of Total Hip Arthroplasties (THA).

References

1. Lewinnek GE, Lewis JL, Tarr R, Compere CL, Zimmerman JR. Dislocations after total hip-replacement arthroplasties. J Bone Joint Surg Am. 1978; 60: 217-220.

2. Lass R, Kubista B, Olischar B, Frantal S, Windhager R, Giurea A. Total hip Arthroplasty using imageless computer-assisted hip navigation: a prospective and randomized study. J Arthroplasty. 2014; 29: 786-791.

3. Dorr LD, Malik A, Dastane M, Wan Z. Combined anteversion technique for total hip arthroplasty. Clin Orthop Relat Res. 2009; 467: 119-127.

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