Custom cutting guides in total knee arthroplasty

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Comment on: Nam D, Park A, Stambough JB, *et al*. The Mark Coventry Award: Custom Cutting Guides Do Not Improve Total Knee Arthroplasty Clinical Outcomes at 2 Years Followup. Clin Orthop Relat Res 2016;474:40-6.

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The role of custom cutting guides (CCG), also known as patient-specific instrumentation, in total knee arthroplasty (TKA) remains controversial. Originally, this technique potentially offered many benefits including: more accurate alignment, less surgical time, and reduced costs. It was hoped that this would translate into better outcomes and longer implant survivorship. In assessing the overall literature, some studies describe improved component positioning (fewer outliers) over manual alignment techniques (1-3). However, studies have demonstrated mixed results for all of the above mentioned parameters (4-6). Therefore, the role of patient-specific instrumentation remains unclear.

To further investigate the potential benefits of CCG, Nam and colleagues (7) performed a retrospective study of 224 patients. These were patients who self-selected to either undergo a standard TKA (n=120) or one utilizing CCG (N=124). Only patients who had a minimum of 1-year follow-up (mean, 3 years; range, 1 to 4 years) were included (97 of 120 in standard cohort, 104 of 124 in CCG cohort). This represents the longest follow-up of this technique to the best of the authors' knowledge. The first consecutive 95 patients in each group were analyzed. The cohorts had no differences in their pre-operative demographics. At final follow-up, there were no differences between the two cohorts in outcomes of multiple parameters including: University of California Los Angeles activity score, short-form 12, and Oxford Knee score. Also, there were no differences in operative time and range-of-motion. Furthermore, there was a large percentage of outliers in each group (23% in standard cohort *vs.* 31% in CCG cohort, P=0.2). Thus, their findings add to the current body of literature suggesting little to no benefit of this technology in total knee arthroplasty (8-11). However, as the authors correctly stated, the design of their study was not optimal to fully investigate these factors; notably, the relatively small sample size, lack of randomization, and the strict inclusion criteria.

Additionally, we believe that the number of outliers is also important to address. Although this difference was not significant, the larger proportion of outliers in the CCG cohort is surprising. It would be interesting to sub-analyze outcome parameters in both patient groups by excluding the outliers, as this might give orthopaedists a clearer picture of what is happening with these optimal patients, and whether they differ from the outliers using either technique. Based on presentations, these authors are doing further research in this specific area with the results forthcoming. Nevertheless, it does not appear that the promised accuracy or improved outcomes of CCGs have been realized based on the results of this study. Perhaps better accuracy will be achieved with robot-assisted TKA and other newer technologies that are on the horizon.

As longer follow-up on these patients becomes available, we encourage the authors of the present study, and all other studies assessing CCG's, to report longer term findings. This is important, as the mixed picture currently present in the literature does not offer adult reconstructive surgeons

better direction with regards to the use of this technology. In addition, parameters such as surgical efficiency and costs of utilizing CCGs, just like CAS, do not appear to be well-investigated or encouraging. However, newer technologies, which aim to achieve similar objectives (better alignment and outcomes), such as robotic-arm assisted total knee arthroplasty; may help eventually replace this technology.

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Footnote

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