

***CORR* Insights®: Rotating-platform TKA No Different from Fixed-bearing TKA Regarding Survivorship or Performance: A Meta-analysis**

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Where Are We Now?

“Which implant should I choose for my patients?” This question continues to be relevant and valid for all arthroplasty surgeons, particularly in a marketplace populated with numerous knee prostheses, each claiming unique advantages, but with some delivering less-than-promised performance. Among the many choices surgeons make among kinds of TKA implants, mobile versus fixed bearings features prominently. Mobile bearings have two theoretically appealing advantages: Increased conformity leading to potentially improved longevity due to reduced wear, and potentially better kinematics and perhaps function owing to self-adjustment in rotational alignment.

This CORR Insights® is a commentary on the article “Rotating-platform TKA No Different from Fixed-bearing TKA Regarding Survivorship or Performance: A Meta-analysis” by Moskal and colleagues available at: DOI: [10.1007/s11999-014-3539-4](https://doi.org/10.1007/s11999-014-3539-4).

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While there is an abundance of clinical series reporting excellent results in terms of pain, function, or durability (many of which were reported by prosthesis designers or high-volume surgeons) [4, 5], there are many randomized controlled trials [1, 3, 10, 13] and others presenting joint registry data [11] that have failed to prove the superiority of mobile bearings compared to fixed bearings. This unproven nature of the superiority of mobile bearings has been echoed by multiple meta-analyses [2, 7, 12, 14–17].

However, one possible argument for mobile bearings is that not all mobile bearings designs are the same, and the lack of evidence for the superiority of mobile bearings may stem from the fact that typically all the different types of mobile bearing system were grouped together for comparison against fixed-bearing implants. Indeed, a previous meta-analysis comparing three different types of mobile-bearing systems (rotating platform, meniscal bearing, and AP-gliding types) found that the 15-year survivorship of rotating platform was greater than that of meniscal bearing (96.4% versus 86.5%) [6]. Another recent meta-analysis comparing the longevity of LCS® (DePuy Synthes, Warsaw, IN, USA) rotating platform with that of nonLCS® knees in the Swedish knee registry found that the 14-year survivorship of LCS® rotating-platform knees was greater than nonLCS® knees [9]. Therefore, it is conceivable that the performances of rotating-platform knees reported in literature could become superior to fixed bearing if comparisons are limited to the studies comparing only rotating-platform mobile bearings with fixed-bearing TKA prosthesis.

Where Do We Need to Go?

In a meta-analysis by Moskal and Capps, the authors determined whether the performance of a rotating platform

is superior to, comparable to, or worse than a fixed-bearing design in four areas: Clinical performance, component alignment, adverse event rates, and revision rates. After applying rigorous inclusion and exclusion criteria, 17 studies published between 2001 and 2013, involving 1,834 contemporary TKAs (rotating platform 930 vs. fixed bearing 904) were included for the ultimate analysis. They found no differences in any of the four areas except for tibial component coronal alignment, which favored fixed bearings. Despite the statistical significance, the small effect size ($p = 0.020$; standardized mean difference, 0.229; 95% CI, 0.035–0.422) does not seem clinically relevant. The authors concluded that there was no compelling merit for either rotating platform or fixed-bearing prosthesis, which was substantially aligned with many previous meta-analyses comparing mobile bearing as a whole versus fixed-bearing systems. The authors further suggested that implant choice should be made on the basis of others factors, perhaps including cost or surgeon experience. This meta-analysis clearly demonstrated that the current evidence in literature does not support the potential argument for rotating platform, a specific type of mobile-bearing system in terms of clinical outcomes and longevity. The authors should be complimented for having posed the important question and accomplished the meta-analysis.

However, this study is not free from the limitations of a meta-analysis. Although a meta-analysis is advantageous compared to primary-source studies in terms of increased statistical power, it can be substantially affected by the weaknesses and heterogeneity of original studies [8]. Most of the original studies (14 of 17) were small series with less than 100 TKAs in each study group. Furthermore, the study numbers included were small for analysis of certain variables (four or less studies for patellar tilt, nonprogressive radiolucent lines, tibial radiolucent lines, osteolysis, loosening, progressive radiolucent lines, component alignment, adverse events, and revision due to loosening). Additionally, the majority of rotating-platform cases (78%, 725 out of 930) were the product of a single company (PFC Sigma[®] [DePuy Synthes, Warsaw, IN, USA]), and the proportion of another well-known and extensively implanted prosthesis, LCS[®] (DePuy Synthes), was only 5% (48 out of 930). Moreover, seven of 17 studies involving a considerable proportion of cases for fixed bearing (30%, 270 out of 904) and rotating platform (31%, 284 out of 930) used a product from a different company for the comparisons, which could have potentially introduced confounding factors other than the design features themselves.

The other limitation of this meta-analysis involves the outcome scales used to compare mobile and fixed bearings. The outcome scales were objective scores, which have been criticized for their insensitivity to what patients really perceive about their replaced knees (Knee Society Knee

Score[©] in 10 studies and function in eight studies). Patient-driven outcome scales such as WOMAC, the Knee Injury and Osteoarthritis Outcome Scale, or patient satisfaction were not included. Finally, the followup period was short (less than 10 years in all 17 studies), which prevents this study from detecting longevity differences at longer-term followup. Therefore, it would be fair to say that this meta-analysis does not entirely preclude the possibility that potential advantages of mobile bearings in function and longevity may be realized over time.

How Do We Get There?

There is no doubt that the choice of a proper prosthesis is one of the most important factors for successful TKA, along with patient and surgeon factors. All related parties including scientists, engineers, surgeons, and governments should continue to endeavor in a harmonious way to improve progress in relevant aspects of knee prosthesis. The concept of dual articulation of mobile bearings, which provides the theoretical advantages of increased conformity and self-adjustment for rotational alignment, may be one direction to explore for further improvement in contemporary knee prostheses. However, new trials may come with unexpected disappointments, which we all have witnessed in numerous trials of new devices. Therefore, any new treatment option that lags behind a time-tested, standard option should be scrutinized to justify its expanded use. A meta-analysis is an effective tool to make a proper discretion on an issue for which data are scanty and no consensus exists. Nonetheless, continuous efforts should be made to determine whether mobile bearing, or a particular type of mobile-bearing system, results in better scores for pain, function, and durability in patients using studies of different kinds, including laboratory, clinical cohort, and prospective randomized controlled studies, as well as studies using joint registry data.

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