Is the revision of a primary TKA really as easy and safe as the revision of a primary UKA?

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Comment on: Leta TH, Lygre SH, Skredderstuen A, *et al*. Outcomes of Unicompartmental Knee Arthroplasty After Aseptic Revision to Total Knee Arthroplasty: A Comparative Study of 768 TKAs and 578 UKAs Revised to TKAs from the Norwegian Arthroplasty Register (1994 to 2011). J Bone Joint Surg Am 2016;98:431-40.

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Unicompartmental knee arthroplasty (UKA) and total knee arthroplasty (TKA) are surgical treatment options for unicompartmental knee osteoarthritis. Clinical results after both TKA and UKA are good, however, functional outcome and return to sport seem to favor UKA (1). UKA also is associated with a lower risk of perioperative complications, like venous thromboembolic events, stroke and myocardial infarction, and a lower blood transfusion rate (1). The main disadvantage of UKA is the lower survival rate in the second decade (1). Patients with a UKA are five times more likely to be revised than patients with a TKA. Liddle *et al*. suggested that per 100 patients receiving a UKA instead of a TKA there would be approximately one fewer death and three more reoperations in the first 4 years after surgery (1). Some authors have argued that the ease of the conversion from UKA to TKA makes UKA appealing despite the overall higher revision rate. However, there have been conflicting reports about this in the literature (2-4). Registries give access to large patient populations and are an appealing data source to investigate the outcome and difficulty of UKA revision surgery. Analyzing the Norwegian Arthroplasty Register, Leta *et al*. investigated the outcome of conversion of UKA to TKA and revision of primary TKA, respectively (5). In a comparative study, the authors reported on 1,346 aseptic knee revision arthroplasties (n=768 primary TKA revised to TKA and n=578 UKA revised to TKA), which were performed between 1994 and 2011. During this period, 3.4% of primary UKAs and 24% of primary TKAs were revised due to infection and these patients were excluded.

The study provided sufficient power to indicate a relative risk of at least 2 in the survivorship-analysis. UKA- and TKA-patients were matched by propensity score analysis regarding age at revision, sex, primary diagnosis, technique and time since revision-surgery. The following outcome parameters were assessed: prosthesis survival, re-revisions-rate, and patient reported outcome measures (PROMs) including EuroQol (EQ)-5D, the Knee Injury and Osteoarthritis Outcome Score (KOOS), satisfaction on the Visual Analog Scale (VAS) and pain on the VAS.

PROMs were available in approximately 20% of all patients and based on a questionnaire, which was sent to patients via mail.

No difference in the overall risk of re-revision was observed in both groups (UKA/TKA: 12% *vs*. TKA/TKA: 13%). However, patients in the TKA/TKA group had a significantly (P=0.03) higher rate of postoperative deep

infections (31% *vs*. 16%). In addition, there was a 2 times higher risk of re-revision in patients with a primary TKA revised at the age of 70 years or above. It is important to highlight that fifty percent of all patients in the TKA/TKA group were over 70 years at the time of revision in this paper. As expected, the operative time (OR) was increased in the TKA/TKA group (+36 minutes) and more knees required stems (58% *vs*. 19%) and stabilization with a constraint or PS implant (27% *vs*. 9%). The study did not differentiate between constraint total knees and PS total knees.

The finding of comparable re-revision rates in both groups are in contrast with reports from the Australian Orthopaedic Association National Joint Replacement Registry which showed a higher risk for re-revision in the TKA/TKA population (6). This has also been discussed by Leta and colleagues.

One of the most important findings of the study is the higher infection rate in the TKA/TKA population since deep implant infection is a devastating complication for the patient. The revision of a primary TKA may be technically more challenging compared to the revision of a primary UKA (7) which is supported by the observation of longer OR times, as well as the increased utilization of stems and constraint. A number of other authors have reported on the relative ease of UKA revision to TKA compared to TKA revision surgery (3,8,9).

The increased infection rates in knees with more complex revision procedures is also supported by Barry *et al*. who reported a correlation of the extend of the surgery and the risk for infection in revision TKA (10). Previous studies have also shown a high deep implant infection rate (56%) in hinged TKAs (11). Peters *et al*. also report that deep implant infections present one of the main reasons for re-revision following revision of a primary TKA (12).

As for UKA/TKA group, there was a higher rate of re-revisions due to tibial loosening. This finding may be the result of excessive tibial bone cuts in primary UKA. Conservative bone cuts during the initial UKA and during the later revision surgery are important (3). Pain after UKA lead to revision surgery more often than in the TKA group (22% *vs*. 12%). The paper therefore provides support for the earlier statement that threshold for revision surgery is lower after UKA surgery. In addition the authors of the study hypothesize that patients undergoing a UKA are younger and, therefore, might have a greater activity level and higher expectations when undergoing primary arthroplasty.

With regard to PROMs, no differences in the EQ-5D, the KOOS, satisfaction and pain were detected between both groups. However, the results might be biased as the preoperative assessment was based on patients' memory. The main weakness of the study is the lack of functional outcome data. As discussed previously, more stems and constraint implants were used in the TKA/TKA group compared to the UKA/TKA group and more complex revision surgeries have been associated with poor functional outcome in the past (13,14).

The current study is a detailed and well-designed study investigating the outcome of revision total knee replacement for UKA and primary TKA in the Norwegian Arthroplasty Registry. Leta *et al*. conclude that overall outcomes of revision of UKA are comparable to revision of primary TKA. However, considering the lower infection-rate and complexity of the revision and fewer re-revisions in patients older than 70 years one can argue that the outcome of UKA revision is superior to primary TKA revision surgery.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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