

Editorial Commentary: Timely Surgery, Optimizing Perioperative Care, and Prospective Data Collection Are Next Steps to Improving Return to Sport and Work Outcomes After Knee Osteotomy



Alexander Hoorntje, M.D., Ph.D., P. Paul F. M. Kuijer, Ph.D., and
Gino M. M. J. Kerkhoffs, M.D., Ph.D.

Abstract: Knee osteotomy is a valuable treatment option for younger knee osteoarthritis patients. Improved surgical techniques, including double-level osteotomies to address femoral and tibial malalignment, have led to reappraisal of this joint-sparing alternative to knee arthroplasty. Yet, postoperative ability to resume sport and work at the desired level needs further improvement. We believe that timely surgery, optimized perioperative care, including evidence-based advice for resumption of activities, and prospective data collection are interesting next steps in this process.

See related article on page 1944

"The older I get, the better I used to be."

— John McEnroe

The debilitating effects of knee osteoarthritis on quality of life and participation in daily life, sport, and work are increasingly seen in younger, active patients. The obesity epidemic and prolonged participation in high-impact sports and work activities contribute to this rising incidence. Younger patients (<60 years of age) are not well served by a knee arthroplasty given the very high revision risk, especially among younger male patients, with a median time to revision of 4-5 years.¹ Consequently, performance of, and research into knee osteotomy is experiencing a revival. The cohort study by Rupp, Muench, Ehmann, Themssl, Winkler, Mehl, Imhoff, and Feucht,² "Improved Clinical Outcome and High Rate of Return to Low-Impact Sport and Work After Knee Double Level Osteotomy for Bifocal Varus Malalignment," is an appealing example. Rupp et al. report in detail about sport and work outcomes of double-level osteotomy

(DLO) for bifocal (i.e., tibial and femoral) varus malalignment.² The authors propagate the use of DLO in such cases to avoid excessive postoperative joint line obliquity, which could negatively affect functional outcomes.

In their well-performed study, the authors used a comprehensive questionnaire to assess 1-year preoperative and postoperative sport and work participation, in line with previous cohort studies.^{3,4} The identification of 38 suitable patients over a 10-year period, in a referral center for knee malalignment corrections, underscores that DLO is not commonly performed. The authors found high rates of return to sport and work, and should be complimented for their additional questions on reasons for no return, i.e., related to the operated knee or due to nonrelated causes. Fear of reinjury contributed to lower return to high-impact activities in a number of patients. We believe that these patients could benefit from personalized, evidence-based guidance from their orthopedic surgeon or physical therapist to return to high-impact activities, which we know is possible.⁵

The retrospective design of this study and most previous studies makes the postoperative findings prone to recall bias. As illustrated by the quote of former tennis icon John McEnroe, patients might tend to overestimate their preoperative or presymptomatic performance of sport and work activities. This may partly

University of Amsterdam

The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

© 2022 by the Arthroscopy Association of North America

0749-8063/2266/\$36.00

<https://doi.org/10.1016/j.arthro.2022.01.027>

explain why $\geq 50\%$ of patients reported equal or worse sport and work ability after knee osteotomy, compared to preoperatively and presymptomatically.^{3,4} Yet, patient factors may have also influenced postoperative sport and work ability in this study, specifically the presence of grade III and IV patellofemoral cartilage defects in 44% of patients, and the fact that two-thirds were smokers. These factors are both relative contraindications for knee osteotomy and can negatively affect functional outcomes. Furthermore, the authors reported further investigations into their surgical technique because of the relatively high complication rate. Here, smoking again might be a contributing factor, although the present literature is ambiguous as to the effect of smoking on bone healing in knee osteotomy.

In our opinion, a desirable solution for recall bias in these studies is prospective data collection, including sport and work outcomes, for knee osteotomy patients. In the Netherlands, patient-reported outcome measures are routinely and prospectively collected for joint arthroplasty procedures in the Landelijke Registratie Orthopedische Implantaten database. Ideally, we should start prospectively collecting these data for our knee osteotomy procedures, following the example of the UK Knee Osteotomy Registry, established in 2014.⁶ Periodical data collection in the first postoperative year allows for identification of fast and slow recovery trajectories, and consequently, return to sport and work recommendations can be optimized for each individual patient.^{7,8} Hence, with this prospective data analysis, the large variety in timing of return to sport and work, varying between 5 and 7 and 9 and 11 months, respectively, in the study by Rupp et al., could be further improved.

Also, timing of surgery is a relevant topic regarding the aim of optimizing sport and work resumption. Cohort studies showed that performing knee osteotomy in athletic patients, with a clear desire to return to sport, resulted in high rates of return to high-impact activities, with median Tegner scores around 5,^{5,9} compared to 3.7 in the study by Rupp et al. Patients who have progressed to Kellgren-Lawrence grade III and IV will undoubtedly have adjusted their lifestyle due to knee impairments. Consequently, significant lifestyle adjustments are required postoperatively to obtain improvements that exceed the preoperative physical activity level, and these are notoriously hard to accomplish. Thus, we would propagate performing knee osteotomy in an earlier phase for symptomatic knees with coronal malalignment, especially in the active patient who has high expectations regarding sport and work participation.

A growing body of evidence confirms that knee osteotomy allows for high rates of return to sport and work, especially in motivated patients. Future challenges include the identification and management of modifiable risk factors for worse functional outcomes (e.g., fear of reinjury, delayed surgery, rehabilitation advice^{7,8}), and of prognostic factors for return to sport and work (e.g., preoperative sport discontinuation,³ preoperative sick leave⁴). Also, an attempt should be made to prospectively collect outcome data worldwide, in order to compare and optimize our outcomes. In this way, knee osteotomy can regain its position as a global cornerstone in the treatment of younger, active knee osteoarthritis patients.

References

1. Bayliss LE, Culliford D, Monk AP, et al. The effect of patient age at intervention on risk of implant revision after total replacement of the hip or knee: A population-based cohort study. *Lancet* 2017;389:1424-1430.
2. Rupp M-C, Muench LN, Ehmann YJ, et al. Improved clinical outcome and high rate of return to low-impact sport and work after knee double level osteotomy for bifocal varus malalignment. *Arthroscopy* 2022;38:1944-1953.
3. Hoorntje A, Kuijer PPFM, van Ginneken BT, et al. Prognostic factors for return to sport after high tibial osteotomy: A directed acyclic graph approach. *Am J Sports Med* 2019;47:1854-1862.
4. Hoorntje A, Kuijer PPFM, van Ginneken BT, et al. Predictors of return to work after high tibial osteotomy: The importance of being a breadwinner. *Orthop J Sport Med* 2019;7:1-10.
5. Kanto R, Nakayama H, Iseki T, et al. Return to sports rate after opening wedge high tibial osteotomy in athletes. *Knee Surg Sport Traumatol Arthrosc* 2021;29:381-388.
6. Elson DW, Dawson M, Wilson C, Risebury M, Wilson A. The UK Knee Osteotomy Registry (UKKOR). *Knee* 2015;22:1-3.
7. Straat AC, Coenen P, Smit DJM, et al. Development of a personalized m/health algorithm for the resumption of activities of daily life including work and sport after total and unicompartmental knee arthroplasty: A multidisciplinary Delphi study. *Int J Environ Res Public Health* 2020;17:1-15.
8. Coenen P, Straat C, Kuijer PP. Knee arthroplasty: A window of opportunity to improve physical activity in daily life, sports and work. *BMJ Open Sport Exerc Med* 2020;6(1).
9. Nakamura R, Takahashi M, Shimakawa T, Kuroda K, Katsuki Y, Okano A. High tibial osteotomy solely for the purpose of return to lifelong sporting activities among elderly patients: A case series study. *Asia-Pacific J Sport Med Arthrosc Rehabil Technol* 2020;19:17-21.