



The weekly recap of what is going on in the world of biomechanics.

1. [Knee Morphological Risk Factors for Anterior Cruciate Ligament Injury](#)
2. [Should We Do More Unicompartmental Knee Replacements?](#)
3. [Free webinars in the field of biomechanics](#)

In the latest issue of the Journal of Bone and Joint Surgery (JB&JS) two interesting articles concerning the knee joint were published at which we will take a look this week. First off, we will present a systematic review dealing with knee morphological risk factors for an ACL injury that might give an outlook to future treatment options, and secondly, we will wrap up a discussion about the use of unicompartmental knee replacements over “traditional” total knee replacements. It might get quite clinical, but also interesting from a biomechanics perspective. Have fun!

Knee Morphological Risk Factors for Anterior Cruciate Ligament Injury:

In the past 25 years, anterior cruciate ligament (ACL) reconstruction incidence has increased substantially. In this systematic review, a research group wanted to gain insight into the influence of knee morphology on ACL injury.

For this purpose, they screened over 6000 studies and a total of 68 studies were ultimately included in the review. That sums up to around 5800 ACL-injured knees being involved in the review. The most common morphological risk factors on the femoral side reported were intercondylar notch stenosis (that is an “A-shaped” notch) and a decreased notch width. Furthermore, increased femoral condylar offset ratio and decreased condylar radius were associated with an increased risk of ACL injury. On the other side, the tibial part, increased tibial slopes were the most commonly reported risk factors. Secondly, a smaller tibial eminence, reduced ACL size, and poor tibiofemoral congruity were associated with a higher risk.



These findings are quite interesting because it might be possible to identify critical morphologic factors during reconstructive surgery and correct these immediately, e.g. a slope correction. Also, it might be possible to find an optimal relationship between notch size and graft size. The factors named might highly benefit the long term prospect of this highly prevalent injury.

Bayer S. et al (2020) .Knee Morphological Risk Factors for Anterior Cruciate Ligament Injury. *The Journal Of Bone And Joint Surgery - Systematic Reviews*: 21 January 2020 - Volume 102 - Issue 8 - p. 703-718 <https://doi.org/10.2106/JBJS.19.00535>

Should We Do More Unicompartmental Knee Replacements?

In the recent issue of JB&JS, New York-based surgeon Per-Hendrik Randsborg commented on an article by Hasan R. Mohammad dealing with the effect of surgeon caseload on the revision rate of different options on knee replacement (have a look at “The Effect of Surgeon Caseload on the Relative Revision Rate of Cemented and Cementless Unicompartmental Knee Replacements” by Hasan R. Mohammad for further details). Very briefly, Mohammad and his group concluded that the cementless unicompartmental knee replacement (UKR) is the way to go, given that the patient qualifies for this type of implant. Cement is toxic, it’s expensive, it adds time to the surgery itself, but most importantly it yields lower revision rates (when surgeon volume and patient characteristics are controlled) than the cemented version.

Yet the surgeon volume appears to be a crucial factor, given the fact that the median caseload for UKR (in the U.K.) is one case per year. Around 50% of the patients getting an arthroplasty are eligible for UKR, yet less than 10% of the arthroplasties are UKR.

That brings up the question why surgeons are so skeptical about UKR and why the total knee replacement (TKR) has the reputation of being more predictable, safer and equally good.

According to Randsborg, this might be due to the unacceptably high revision rates of the



early UKR implants, which had poor designs, replaced only the tibia or consisted of unfavorable materials. After improving these factors, aseptic loosening of the cemented UKR became the leading cause of revision. That led to the development of the cementless UKR in 2003. Yet the revision rates presented by Mohammad et al. indicate that we still see a higher risk of an early revision with UKR, unless it is implanted by a high-volume surgeon. This leads to the conclusion, low-volume surgeons should either increase the caseload drastically or stop doing the surgery entirely.

Let's sum this up: The UKR is, for eligible patients, the better option. It is less invasive, and only addresses the diseased compartment of the knee. It provides quicker recovery, fewer early complications and better patient-reported outcomes when compared with TKR. But it is of great importance that the surgeon is highly familiar with the procedure.

From the perspective of a biomechanist, we can see how multifactorial the chances of success of the implants we construct are. Like Randsborg and Mohammad et al., we have to look at the challenges in its entirety when we want to improve on our long term outcomes.

Randsborg, P. (2020). Should We Do More Unicompartmental Knee Replacements?. *The Journal Of Bone And Joint Surgery - Commentary And Perspective*: 15 April 2020 - Volume 102 - Issue 8 - p. e35 <https://doi.org/10.2106/JBJS.20.00059>

Mohammad, H. R., Matharu, G. S., Judge, A., & Murray, D. W. (2020). The Effect of Surgeon Caseload on the Relative Revision Rate of Cemented and Cementless Unicompartmental Knee Replacements: An Analysis from the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man. *JBJS*. <https://doi.org/10.2106/JBJS.19.01060>

Free webinars in the field of biomechanics

Due to the continuing exceptional situation of COVID-19, some initiatives have been taken to provide interested people with knowledge from home. So naturally also in biomechanics. In the meantime, the offer is so large that it is easy to lose track.

Therefore we have made a list of upcoming and past events and will continue to update it in



the future. The events include webinars on software, technology and clinical- as well as sports biomechanics. This [link](#) leads you to the complete list!