HOW DO COMMON COMPONENT ALIGNMENT GOALS FOR TOTAL KNEE ARTHROLASTY AFFECT KNEE FUNCTION?

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ABSTRACT

There is room for improvement in the outcomes after total knee arthroplasty (TKA). Currently, 15-20% of patients report some dissatisfaction following TKA, and they cite symptoms including stiffness, instability, residual pain, and/or functional limitations as the source of their dissatisfaction. These symptoms are also associated with the reasons for revision procedures. With the number of patients to undergo TKA annually in the United States alone expected to reach 3.5 million by 2030 and at the present rate of patient dissatisfaction, 700,000 patients per year in the United States alone will be dissatisfied. Furthermore, the percentage of patients < 65 years old who undergo TKA is projected to increase from 47% to 55% by 2030. These younger patients will likely have higher functional expectations than older patients. Hence, it is imperitive to improve the outcomes of TKA.

While many factors affect the outcome of a TKA, component alignment is currently the most hotly debated. This is evident by numerous landmarks used to set the coronal (i.e. varus-valgus) and transverse (i.e. internal-external rotation) alignment of both the femoral and tibial components. Due to the wide variability in both the anatomy of the lower extermities and biomechanics of the knee, striving to achieve a single alignment goal in all patients likely will not lead to optimal outcomes for all patients. Recent studies have shown that even though advances in surgical techniques enable surgeons to more precisely achieve a desired alignment of each component, patient outcomes have not improved. The lack of improvement may be caused by selecting the incorrect alignment goal for that patient.

Accordingly, the overall aim of this study is to demostrate the impact that patient-specific models can have on both the planning and execution of TKA. This aim will be accomplished by (1) evaluating common component alignment goals in patients with different pre-operative alignments, (2) determining the sensitivity of knee biomechanics to component alignment errors, and (3) demonstrating how patient-specific models might be used to determine intraoperative biomechanical checks (Fig. 1).

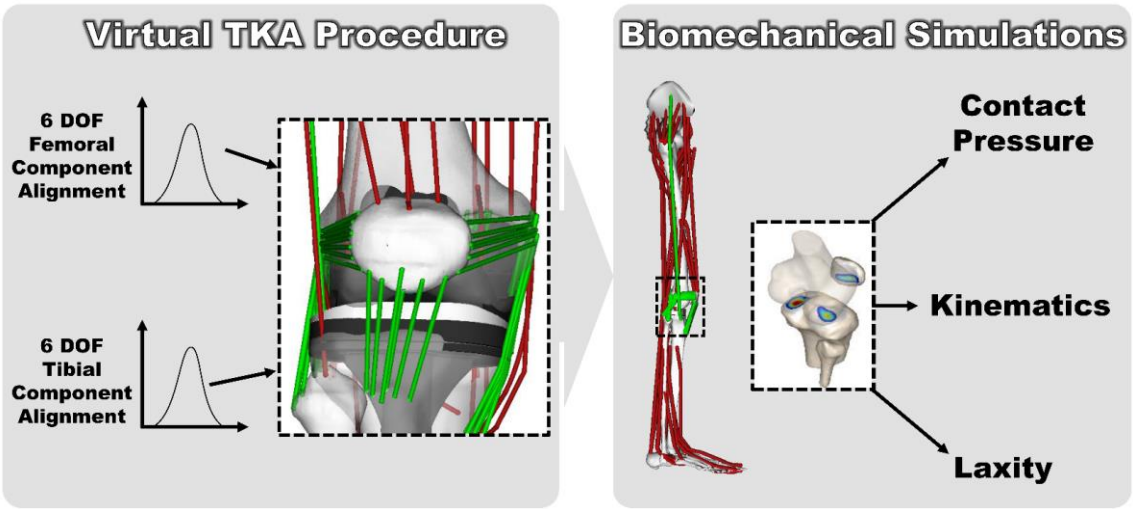

Figure 1. Patient-specific models can impact both the planning and execution of TKA.