How Many Days Can Laxity be Measured in a Human Cadaveric Knee with a TKA Before Clinically Important Changes Occur? Jeremy A. Riley¹, Stephen M. Howell^{1,2}, Maury L. Hull^{1,2,3}

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INTRODUCTION

Human cadaveric knees are routinely used in the study of total knee arthroplasty (TKA). The process of acquiring, preparing, and performing TKAs on human cadaveric knee specimens is both time and cost intensive. Therefore, it is advantageous to collect as much data as possible on a particular specimen. However, the soft tissues of a human cadaveric knee specimen will degrade over time. Accordingly, the objective of this study was to determine how many days the laxities of a knee with a TKA can be measured before clinically important changes occur.



Three fresh-frozen human cadaveric knees were included (ages Figure 1. Schematic showing the six degrees of

- 69, 90, and 92). TKA using kinematic alignment was performed on each knee.
- Following preconditioning, the laxities in internal-external (E) rotation, varus-valgus (V-V) rotation, anterior-posterior (A-P) translation, and compression-distraction (C-D) translation

were measured at 120°, 120°, 30°, and 120° flexion, respectively, five times each using a load application system (Figure 1).

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freedom of the load application system. The load application system embodies the coordinate system of Grood and Suntay (JBME, 1983). As such, the femoral assembly allows two degrees of freedom, flexion-extension (F-E) rotation and medial-lateral (M-L) translation. The tibial assembly allows the remaining four degrees of freedom, which include V-V and I-E rotations and A-P and C-D translations.

The procedure for step (2) was repeated at the beginning and end of days 2 through 7. Day 1 was used as a baseline. During the middle of each day, regular laxity testing was performed two times. Regular laxity testing consisted of measuring the I-E, V-V, A-P, and C-D laxities from 0° to 120° flexion in 30° increments. In total, there were 80 laxity cycles and 6 hours of testing per day. One laxity cycle consisted of loading the knee to its positive limit, negative limit, unloaded position, negative limit, positive limit, and unloaded position.



To determine how many days of laxity testing were performed before significant changes occurred, a singlefactor repeated measures ANOVA was performed. Dunnet's test was used to compare the mean laxities at the beginning of Day 1 to each time point from the beginning of Day 2 to the end of Day 7.



Figure 2. Mean (bar) and standard deviation (error bars) of the (A) I-E, (B) V-V, (C) A-P, and (D) C-D laxities over the course of 7 days. Statistically significant differences

