**Comparison of Clinic-Based Biomechanical Measures During Walking to Laboratory Measures after Total Knee Arthroplasty**

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**Purpose/Hypothesis:** Abnormal movement patterns during walking, such as asymmetries in between-limb vertical ground reaction force (vGRF), are common after total knee arthroplasty (TKA) and are related to poorer long-term outcomes; however, clinically feasible methods to assess movement biomechanics are needed. Insole pressure measurement systems are capable of measuring kinetics in clinic settings and prior research has validated vGRF, impulse, and loading rate assessments using insole sensors with concurrently collected motion capture data. However, the relationship between measurements collected clinically to those collected in a laboratory setting has not been examined. Therefore, the purpose of this study was to compare clinic-based measures of gait biomechanics using insole sensors collected during a physical therapy session to laboratory-based motion capture measurements 10-weeks after TKA.

**Number of Subjects:**61 (aged 65±8 years)

**Materials and Methods:** Subjects underwent biomechanical assessments while walking at a self-selected pace 10-weeks after TKA under two different conditions on different days: 1) using single sensor insoles (Loadsol, Novel Electronics) during a physical therapy intervention session (clinic-based assessment) and 2) using an 8-camera motion capture system and embedded force plates (laboratory-based assessment). Average vGRF, impulse, and loading rate for the surgical limb, uninvolved limb, and between-limb symmetry ratio (surgical/uninvolved) were collected during both sessions. Clinic and laboratory-based measurements were compared using paired t-tests and intraclass correlation coefficients (ICC 3,k). ICCs were interpreted as follows: <0.50 poor, 0.50-0.75 moderate, 0.75-0.90 good, >0.90 excellent.

**Results:** Symmetry ratios and uninvolved-limb vGRF were not different between clinic and laboratory-based assessments (p>0.05) but were different for surgical limb vGRF, impulse and loading rate (p<0.05) and uninvolved limb impulse and loading rate (p<0.05). ICCs for all measurements were less than 0.5, indicating poor consistency between clinic and laboratory-based measurements.

**Conclusions:** Clinic-based symmetry ratios demonstrated greater accuracy than individual limb measurements of vGRF, impulse, and loading rate with laboratory-based measurements of walking 10-weeks after TKA. This may be due to ratios having the advantage of correcting for systematic differences in magnitude (e.g. insoles forces being lower on both surgical and uninvolved limbs). The poor consistency between clinic-based measurements and laboratory-based measurements could be due to several factors: 1) differences in data collection methods (e.g. environment); 2) subject variability; or 3) measurement-error.

**Clinical Relevance:** Insole pressure measurement systems may have clinical utility as a less-costly alternative to motion capture systems for investigating between-limb kinetic symmetry. However, future research is needed to determine optimal methods for increasing accuracy and consistency between clinic-based and laboratory-based measurements of gait biomechanics after TKA.

**References (5-7 References 2018 or Later)**

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