Reliability and Validity of Five Lower Extremity Outcome Measures for Ankle Arthroplasty and Arthrodesis

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Introduction:
Assessment of hindfoot surgical interventions via validated and specific functional outcome scores has evolved over the past decade. A number of outcome measures have been used, but they vary substantially in content, have not been directly compared, and some have not been psychometrically validated in this patient population. The purpose of this study is to directly compare the measurement properties of 5 self-report lower extremity measures and to evaluate the reliability and validity of these instruments in light of patients’ preferences.

Methods:
Forty-two pre-operative and 100 post-operative (18 arthrodesis, 82 arthroplasty) ankle patients were recruited from an orthopaedic practice in an urban teaching hospital and completed a cross-sectional survey. Patients completed five lower extremity instruments on two occasions: Foot Function Index (FFI), patient-reported section of the American Orthopedic Foot and Ankle Society Questionnaire (AOFAS), Lower Extremity Functional Scale (LEFS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and the Short Musculoskeletal Function Assessment Form (SMFA). Measures of instrument preference, expectation, satisfaction and current status were also included in the survey package.

Results:
Scores were in the mid-range of the scales. Internal consistency was high for all the scales and subscales ($\alpha$ 0.84-0.97; ICC (2,1) 0.86-0.96). Correlations between scales ranged from 0.50 (WOMAC Stiffness subscale and FFI Activity Limitations subscale) to 0.96 (FFI Disability and FFI Overall). Higher correlations occurred between subscales from the same instrument and similar subscales from different instruments. Construct validity showed moderate to high correlations to global ratings of pain, stiffness and difficulty performing daily activities (ADL). The highest correlations ($r>0.75$) occurred between the global rating of stiffness and WOMAC Stiffness ($r=0.81$), global ADL and WOMAC Physical Function ($r=0.82$), and global ADL and both FFI Overall ($r=0.86$) and LEFS ($r=0.86$).

Instruments were ranked by patients for preference. FFI, WOMAC, LEFS and SMFA were favorably ranked by patients in terms of length. FFI, WOMAC, LEFS, and AOFAS ranked high for understandability. FFI was rated the most likely to capture the surgical experience by post-operative patients, and SMFA was rated the best overall questionnaire.

Conclusions:
Direct comparison of the five functional outcome measures revealed similarity between scales in terms of construct validity and internal consistency. Based on the measurement parameters evaluated, no single outcome measure appeared to have clearly emerged as being superior to the others. Region-specific scales, focusing on the foot and ankle, were not found to offer a clear advantage over the other lower extremity scales (WOMAC, LEFS) or the more general SMFA. Patient preferences supported use of both the SMFA and FFI.