Acute all forms of medicine there has been a contemporary push for the utilization of functional outcome measures in order to better assess the efficacy of treatment modalities, effectively the recovery process following injury and surgical intervention, and evaluate patient satisfaction. These include measurement of both patient subjective symptoms and more dynamic and objective functional physical functional outcomes. It has yet to be standardized as to how quality of life that 36 health care centers, hospital and third party payers are working towards value-based outcomes-based reimbursement strategies using these measures.

Injuries to the ankle complex are quite common. In a systematic review conducted by Pu et al., the ankle was found to be the most common site of injury in 24 of 30 evaluated sports, and 22% of sprain injuries presenting to emergency room were ankle injuries [11]. Furthermore, history of ankle sprain is the most predominant pre-disposing factor of another ankle sprain [2]. These both might suggest chronic injuries. Patients who have sustained an ankle fracture may experience continued symptoms, such as pain and stiffness, and it is common to suffer from chronic instability following a sprain [3]. These studies highlight the importance of not only effective treatment, but also having a reliable, valid outcome measure to track patient progress.

Shibuya et al. found a significant correlation between the rearfoot component (Module 3) of the ACFAS Scoring Scale and other subjective validated outcome measures in patients with a high level of residual post-surgical pain, as a comparison for normal subjective patient symptoms. It is our hope that this data is used by future investigations to develop a more objective validated measure of lower extremity abnormality and functional capacities.

The objective of this investigation was to evaluate the correlation between the Foot Function Index (primarily a patient reported outcome measure), the Star Excursion Balance Test (SEBT) and the ACFAS Scoring Scale (combines both patient-reported and dynamic functional components).

Methodology

Following approval by our Institutional Review Board (Touro University Hospital Protocol #20709), twenty patients treated at the Temple University Foot and Ankle Institute for an acute ankle sprain (fracture or strain) or chronic ankle instability were prospectively enrolled. Before enrollment, they were evaluated by study authors under the supervision of study advisors with the HFA, ACFAS Scoring Scale Module 4, and anterior reach component of the ICF. Exclusion criteria included patients that were not able to walk independently, or those with major comorbidities that may affect the outcome of the study.

The Foot Function Index (Figure 1) is a self-administered tool which was developed to quantify the impact of foot pathology on function as it relates to pain, disability, and activity limitation. The items are scored using a Likert scale ranging from 1 to 5 (5 = best). The mean Foot Function Index score was 70.2 ± 28.5 (66.9% ranging from 3.5% to 86.2%)

The ACFAS Scoring Scale (Figure 1) is a clinical assessment instrument that measures both subjective and objective parameters [7]. There are four distinct modules to the ACFAS Scoring Scale. Each module consists of a total of 100 potential points (50 subjective, 50 objective), with higher values correlating to improved functionality and decreased pain. For the purposes of this study, we focused on the ankle module. The subjective parameters are broken down into sections on pain, appearance, and functional capacities, while the objective parameters include radiographic findings and measures of function. We modified the radiographic portion to align with our facility’s standard practices, which typically do not include the long leg calcaneal axial view and relative ankle rotation of the ankle measurements following acute ankle injury. This modification effectively decreases the possibility of any residual post-surgical pain, the total maximum overall ACFAS score from 100 to 94.

The Star Excursion Balance Test (SEBT) measures single leg balance, strength, and mobility by means of a commercial measurement system. Pu et al. observed a difference in anterior reach between the right and left leg is indicative of instability and predicts of future ankle injury [11, 12]. Participants were instructed on the SEBT and given an opportunity to practice five trials on each leg prior to study data collection.

A purpose built dynamometer performed with frequency scatter plots derived and a Pearson correlation coefficient calculated for each comparison [13].

Results

The results of this investigation provide evidence in support of and to some degree validates the purely subjective patient reported measures, the SEBT and the ACFAS Scoring Scale, which includes both subjective and objective components, in a cohort of patients following ankle injury. Overall, our subject population demonstrated a clinically significant mean SEBT difference of 6.7 ± 8.1 cm, indicating a substantial functional deficit was present. This exceeds the 4 cm threshold difference used to gauge return to activity, and indicates that our studied participant cohort did in fact have functional ankle impairment.

When directly compared, the SEBT and FFI demonstrated a clear positive relationship. Thus, as the SEBT difference increased between limits, the FFI score also increased. This illustrated the expected interpretation of both patient’s self-report and physician’s subjective evaluation of instability. The Star Excursion Balance Test (SEBT) quantifies dynamic balance, and has been shown to be effective in detecting objective functional deficits in patients with ankle instability [8-9]. It may also be used to help physicians assess patients activity following injury.

One limitation of this investigation is the small sample size. A larger sample size would yield correlation data of higher power. It would also be interesting to associate these outcome measures with length of time following injury. Another factor perhaps worthy of future investigation is the effect of conservative and/or surgical interventions on subjective and objective functional outcomes. It has been very encouraging that patients with ankle injuries often present with little radiographic or clinical evidence of degenerative pathology or residual post-surgical instability yet still experience chronic pain after treatment. While this study did not set time of onset restrictions or treatment exclusions, future investigations could standardize these parameters and track outcomes at various times throughout treatment.

The results of this investigation provide evidence in support of the use of the ACFAS Scoring Scale, FFI, and SEBT in the evaluation and treatment of patients with ankle injury. It also provides a degree of validity to the ACFAS Scoring Scale when used to evaluate patients with ankle injury, and further provides evidence of a link between objective ankle disability and subjective patient symptoms. It is our hope that this data is used by future investigations to create a better understanding of the natural history of these troubling lower extremity injuries and how to best guide our patients in their rehabilitative efforts and eventual return to activity.