

VALIDATION OF THE FOOT AND ANKLE OUTCOME SCORE FOR USE IN INFRACALCANEAL HEEL PAIN

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STATEMENT OF PURPOSE

To attempt to validate the Foot and Ankle Outcome Score (FAOS) for use in patients with infracalcaneal heel pain (i.e., plantar fasciitis). FAOS is a commonly used patient-reported outcome measure (PROM) that has already been validated for use in several foot/ankle disorders, but not plantar fasciitis. This was accomplished by assessing the survey's construct validity, content validity, reliability and responsiveness in patients who had presented to our practice for treatment over the past 3 years.

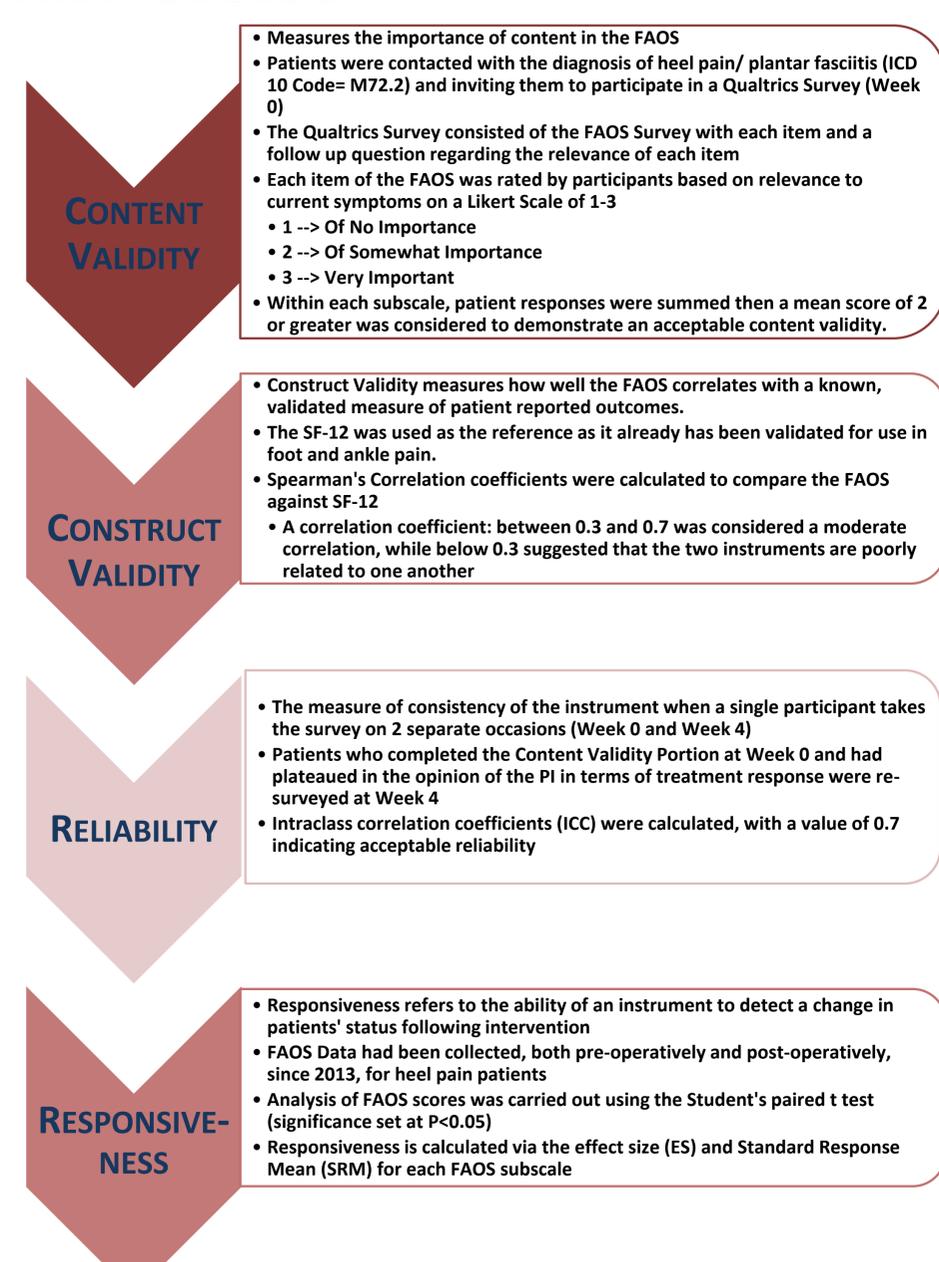
LITERATURE REVIEW

Heel pain is one of the most common complaints seen by the foot and ankle specialist and may be present in upwards of 11-15% of adults¹. Plantar fasciitis is first treated with conservative, non-operative measures, and it is not uncommon to see most patients improve within 6 weeks of formal treatment. In fact, non-operative therapeutic regimens may see as many as 90% to 95% of patients experience resolution of symptoms within 1 year^{2,3}. For those that do not improve with conservative measures, there are a variety of surgical and more invasive procedures available such as the plantar fasciotomy, ESWT, radiofrequency coblation, or the use of a gastrocnemius recession in combination with or without a plantar fasciotomy. Most of these procedures have been well described in the literature with good to excellent long-term outcomes, but most studies investigating the outcomes of surgical intervention for infracalcaneal heel pain have lacked the use of a validated patient-centered outcome measure



- The use of validated outcome scores have become the standard to evaluate patient function before and after surgery⁴.
- There is, furthermore, an increasing demand for validated patient-centered outcome measures in the use of foot and ankle pathologies⁵.
- Despite being the most heavily used outcome score for heel patients, the AOFAS Hindfoot scoring scale is no longer recommended for use^{6,7}.
- In addition to its failure to capture patient-reported outcomes, the AOFAS surgery has been shown to have poor construct validity⁸.
- The American Orthopedic Foot and Ankle Society has even advised against the continued use of the AOFAS rating systems⁹.
- The FAOS, in contrast, has been validated for multiple foot and ankle pathologies including hallux valgus, adult flatfoot, lateral ankle instability, ankle osteoarthritis, and most recently for hallux rigidus¹⁰.
- FAOS is a 42-item questionnaire consisting of 5 different subcategories including: symptoms, pain, and functions of daily life, functions of sporting and recreational activities and quality of life, all pertaining to the foot and ankle.
- The survey is entirely self-administered and can be completed in less than 10 minutes.

METHODOLOGY



RESULTS

- A total of 58 patients were included in one or more of the four major components of this study: construct validity, content validity, reliability, and responsiveness. The mean age of the population was 49.7 +/- 12.1 yrs (13 men and 45 women).
- Spearman Correlation Statistics between 0.3 and 0.7 indicate moderate correlation. All FAOS subscales demonstrated adequate construct validity when compared with the physical health component of the SF-12, and 2 out of 5 subscales demonstrated moderate correlation with the mental health component of the SF-12. (Table 1)

| SF-12 subdomain | Stat | FAOS Pain | FAOS Symptoms | FAOS ADLs | FAOS Sport/rec | FAOS QoL |
|---------------------------|-------------------------|-----------|---------------|-----------|----------------|----------|
| Physical health component | Correlation coefficient | 0.3187 | 0.3701 | 0.3908 | 0.5079 | 0.4483 |
| | P value | 0.0392 | 0.0118 | 0.0075 | 0.0003 | 0.0018 |
| Mental health component | Correlation coefficient | 0.3495 | 0.2676 | 0.3676 | 0.2353 | 0.2709 |
| | P value | 0.0180 | 0.0754 | 0.0124 | 0.1202 | 0.0717 |

Table 1. Construct validity between SF-12 and FAOS (N=45).

- A mean score of 2 or greater was considered acceptable content validity
- Three out of 5 subscales demonstrated satisfactory content validity. (Table 2)
- ICC represents the intraclass correlation coefficient
- The time between the first and second administration of the FAOS survey was 4 weeks for all 18 subjects.
- These subjects all related no change in their infracalcaneal symptoms between administrations.
- All five-subscale demonstrated good test-retest reliability with ICCs of 0.8 and higher. (Table 3)

| FAOS Subscale | Mean +/- SD |
|-------------------|---------------|
| Pain | 2.10 +/- 0.56 |
| Symptoms | 2.06 +/- 0.45 |
| Daily Activities | 1.82 +/- 0.57 |
| Sports/Recreation | 1.87 +/- 0.63 |
| Quality of Life | 2.29 +/- 0.62 |

Table 2. Mean relevance scores for each FAOS subscale (N=34).

| FAOS Subscale | Mean +/- SD first FAOS | Mean +/- SD second FAOS | ICC |
|-------------------|------------------------|-------------------------|----------------------|
| Pain | 60.6 +/- 22.8 | 58.2 +/- 19.2 | 0.926 (0.802, 0.972) |
| Symptoms | 61.1 +/- 20.4 | 57.6 +/- 20.7 | 0.929 (0.810, 0.973) |
| Daily Activities | 71.9 +/- 22.8 | 68.7 +/- 23.3 | 0.892 (0.712, 0.960) |
| Sports/Recreation | 62.8 +/- 29.7 | 69.4 +/- 27.3 | 0.896 (0.723, 0.961) |
| Quality of Life | 46.1 +/- 23.0 | 40.4 +/- 20.5 | 0.827 (0.536, 0.935) |

Table 3. Reliability of FAOS subscales (N=18).

- Four of the 5 FAOS Subscales (all but Symptoms) were responsive to change after effective treatment.
- The effect size (ES) indicates that sports/ rec and Quality of Life were the most responsive subscales

| FAOS Subscale | Pre-treatment score +/- SD | Post-treatment score +/- SD | p Value | ES |
|-------------------|----------------------------|-----------------------------|---------|------|
| Pain | 58.1 +/- 20.2 | 78.3 +/- 13.4 | 0.0003 | 12.9 |
| Symptoms | 66.9 +/- 14.5 | 70.8 +/- 16.6 | 0.2979 | 10.5 |
| Daily Activities | 68.0 +/- 18.7 | 85.9 +/- 9.0 | 0.0004 | 11.7 |
| Sports/Recreation | 60.9 +/- 29.5 | 82.2 +/- 17.8 | 0.0245 | 25.4 |
| Quality of Life | 33.2 +/- 26.8 | 57.8 +/- 25.4 | 0.0176 | 27.6 |

Table 4. Responsiveness of FAOS subscales (N=17).

DISCUSSION

There remains a continued need for validated and reliable patient outcome measures in foot and ankle surgery. The FAOS has proven to be a reliable and validated patient outcome measure for other foot and ankle pathologies. Our study demonstrates acceptable construct and content validity, reliability and responsiveness of the FAOS for Infracalcaneal Heel Pain. Construct validity shows the ability of an instrument to measure what it was intended to measure. In comparing the FAOS to the SF-12, all of the FAOS subscales demonstrated good overall correlation with the physical health component. There was poor correlation with the mental health component with 2 out of the 5 subscales demonstrating moderate correlation which is consistent with previous studies¹⁰. Content validity (relevance) of the FAOS from the patients perspective, was deemed relevant in 3 out of 5 subscales of the FAOS. The ADLs subscale trended towards relevance as in previous studies¹⁰ and once again questions the ability of the ADLs subscale to adequately play a role in a patient's assessment of their outcome. There was acceptable test-retest reliability across all 5 subscales of the FAOS, though the short time frame between assessments could bring in to question the ability of the FAOS to accurately assess the immediate and long term. Our findings of an ICC of 0.827 or greater, were as good if not better than previous literature¹⁰. The responsiveness of the FAOS when evaluating infracalcaneal heel pain was found to be significant in 4 out of 5 subscales with symptoms being not statistically significant. This could be due to the relatively small difference in the pre-treatment and post-treatment scores.

CONCLUSION

Our study demonstrates that the FAOS is a responsive, reliable and valid patient-reported outcome measure for infracalcaneal heel pain. The FAOS has been validated previously for hallux rigidus, lateral ankle ligament reconstruction, hallux valgus and adult acquired flatfoot deformity¹⁰. The continued applicability and validity of the FAOS as a patient-reported outcome measure for foot and ankle pathology demonstrates that the FAOS can reliably be used for infracalcaneal heel pain.

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