

1 **Outcome evaluation after Achilles tendon ruptures. A Review of the literature**

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4

5 **Running title: “Achilles Tendon Function: evaluation tools”**

6

7 **Abstract**

8

9 The optimal treatment and the best rehabilitation protocol after an acute Achilles tendon rupture
10 (ATR) remain a matter of controversy in orthopedic and sports medicine. The use of validated
11 injury-specific outcome instruments is the only way to clarify these aspects, in order to ensure our
12 patients the best possible treatment.

13 This article describes the most commonly reported evaluations instruments useful to assess patients
14 treated for a ruptured Achilles tendon. Based on the available evidence, the Achilles Tendon Total
15 Rupture Score (ATRS) is the most appropriate outcome measure for evaluating the management of
16 acute ATR.

17

18 **Keyword:** Achilles tendon; surgical treatment; conservative treatment; outcome evaluation.

19

20 **Introduction**

21

22 In recent years, the demand for validated, reliable and responsive outcome measures has been
23 growing. Proper evaluation tools are of utmost importance both in the scientific settings, to
24 evaluate and compare research studies, and in the clinical settings, to guide therapeutic
25 decisions and assess the progression of treatment.

26 Acute Achilles tendon rupture (ATR) is one of the most common tendon injuries in the adult
27 population, especially in men in their third and fourth decades of life [1].

28 Despite the improvement of knowledge about Achilles tendon pathology, the optimal treatment
29 and the best rehabilitation protocol after an acute rupture remain a matter of controversy in
30 orthopedic and sports medicine. The knowledge and the use of validated injury-specific
31 outcome instruments is the only way to clarify these aspects, in order to ensure our patients the
32 best possible treatment.

33 This article describes the outcome measures reported in the literature for the assessment of
34 patients following ATR. The aim is to provide clinicians and researchers with the available
35 evidence regarding what evaluation tools should be used for this specific injury.

36

37 **Outcome measures following ATR**

38

39 The outcome instruments to evaluate the functional results following an Achilles tendon rupture can
40 be broadly divided in two types: objective measures and patient-reported measures.

41 The former are parameters directly taken by the clinician, such as ankle range of motion (ROM) or
42 calf muscle strength measurements. These objective data, arising from the patient's physical
43 examination, have traditionally formed the basis of the functional assessment following an ATR.

44 However, over the past two decades, it has become increasingly recognized that the patients'
45 perspective of outcome is of utmost importance in judging the results of a treatment [2].

46 At this regard none of the traditional objective parameters has been convincingly correlated with
47 patient satisfaction [3,4].

48 Therefore, it is now well accepted that traditional defined outcomes need to be complemented by
49 measures that focus on the patient's feeling toward a given treatment. This assumption is well
50 demonstrated through the explosion in the literature of the patient reported outcome measures,
51 namely questionnaires completed by patients to measure their perceptions of their own functional
52 status and wellbeing.[5-7].

53 Objective and subjective parameters used to evaluate treatment modalities for ATR are variably
54 reported in the literature, whether as isolated measures or grouped in different multi-items scoring
55 systems (**Table 1**).

56 Validity, reliability and responsiveness are the clinimetric properties that define the clinical
57 relevance of each outcome measure [8]. At this regard, It is worthy to remember that the
58 establishment of the usefulness of an outcome instrument is never completed. It is an ongoing
59 process whereby evidence is collected to support its use under various conditions [9].

60

61 **Objective measures**

62

63 After ATR patients have been reported to show a lengthening of the healed tendon along with
64 impairments in the joint ROM, strength, endurance and calf muscle trophism. Therefore, when
65 evaluating the final outcome of treatment, it is important to include these clinician-generated
66 measurements [10]. Each of these parameters is usually compared in the injured and healthy side, to
67 establish the limb symmetry index expressed as a percentage [11].

68

69 *Achilles tendon lengthening*

70 Some thirty years ago Nystrom showed a postoperative separation of the tendon ends after
71 suturing a ruptured Achilles tendon, in patients immobilized for 3 weeks in a position of

72 slight plantar flexion [12]. Schepull et al confirmed more recently these observations,
73 describing a biphasic lengthening of the tendon in the recovery period after an ATR,
74 regardless the type of treatment [13].

75 Despite the improvements in therapeutic strategies, Achilles tendon lengthening following rupture
76 remains a frequent undesired complication, assumed to cause functional modifications in ankle
77 range of motion, strength deficits and gait abnormalities [14-16].

78 A proposed relation between elongation and functional impairments is that the lengthening of the
79 tendon reduces the tension of the whole musculotendinous unit. As a consequences the power
80 produced by the calf muscle contraction decreases because the muscle is potentially acting at a
81 different position of its force-length curve[16]. The tension of the unit is also necessary for the
82 hypertrophic process of the muscle fibers. Therefore the slack of the tendon can also affect the
83 potential for strength recovery through physical therapy [17]. Schepull et al could not find any
84 correlation between tendon elongation and others functional outcomes after ATR [13], suggesting
85 that, probably, a variation in elongation within reasonable limits might not influence the end result.

86 Currently there is no clear definition and no validated outcome measure for tendon
87 elongation at all. Nystrom described the placement of thin steel wires on each tendon ends
88 during the surgical repair and subsequent direct measures of the position of the marker on
89 postoperative standardized X-ray [12]. Silbernagel evaluated Achilles tendon length as the
90 distance between calcaneal osteotendinous junction and musculotendinous junction, by
91 means of non invasive ultrasound imaging [15]. Selvik et al reported the use of Roentgen
92 Stereophotogrammetric Analysis (RSA) to measure the distance between implanted
93 tantalum beads in three dimensions with high accuracy [18].

94 In conclusion, given its potential influence on functional recovery, an important treatment
95 goal appears to be to minimize tendon elongation.

96

97 *Strength*

98 Calf muscle strength is significantly deteriorated following ATR. The majority of the reports on the
99 functional outcome after an ATR show a permanent strength deficit, up to 30% compared to the
100 uninjured side [19,20].

101 The treatment of Achilles tendon ruptures should not only restore Achilles tendon length but the
102 original strength of the whole muscle–tendon unit, because of the detrimental effects related to
103 persistent calf muscle strength deficit [17]. Several studies report strength measurements through
104 dynamometry as an evaluation outcome after surgical and conservative treatment of ATR. [21-23].
105 Currently, there is no consensus regarding the best method to determine strength. Both isokinetic
106 and isometric measurements of ankle dorsiflexion and plantar flexion power are reported, as well as
107 eccentric and concentric surveys. The position used in the clinical setting to measure these
108 parameters also varies between studies [17,21-24]

109 The reliability of the isokinetic and isometric dynamometry is generally high, and the various
110 testing positions for plantarflexion and dorsiflexion have good test-retest reliability [25,26].
111 Strength deficits following an acute ATR seem to be related to anatomical and structural changes of
112 the healed tendon, namely elongation, as the ability of the calf muscle to contract does not reduce
113 after the injury [16].

114 However, it is important to remember that although strength tests are valid for measuring
115 improvements in strength, they are only moderately correlated to functional performance and they
116 need to be complemented with other type of functional assessment [17,27].

117

118 *Endurance/heel rise test*

119 The muscular endurance evaluation is another type of muscle function measurement. The heel rise
120 test is the most commonly used test for measuring the muscular endurance of the calf musculature
121 [28] (Fig1).

122 The testing position for the subject is standing on one leg, while maintaining a straight knee,
123 support with the fingertips for balance and avoiding body sway forward. It is important to instruct

124 the patient to go as high as possible for every heel-rise. Heel rise can be measured both in term of
125 number of repetitions and height of each heel-rise [29]. This test has been shown to be reliable,
126 valid and responsive in patients with ATR [30,31].

127 Following an ATR there is a significant deficit in heel-rise height and repetition between injured
128 and uninjured side [14,15,29]. Silbernagel et al showed a correlation between the degree of tendon
129 elongation and the side to side deficit in heel rise height [15]. The test also correlated well with
130 isokinetic measurements in several research studies [4,19,30].

131 Due to these observations, along with the ease of execution, the heel rise test is recommended as a
132 measure of functional recovery after ATR.

133

134 *Calf muscle size*

135 Calf muscle circumference is measured to determine muscular trophic modifications after rupture
136 and during the recovery phase. It is important to remember that some aspects, as swelling and body
137 composition – relative presence of fat tissue versus muscle tissue – avoid unambiguous
138 interpretations of circumference values.

139 Different techniques are described to measure this parameter. Some authors propose CT or MRI
140 measurements techniques [13,22,23], while others report circumference values detected by hand at
141 predetermined positions related to bony landmarks [33] (Fig 2). Regardless the technique the calf
142 circumference is described as a reliable parameter [30,32]. Nevertheless its correlation with other
143 important outcomes, such as calf muscle endurance and strength, is debated [17,19,33].

144 Leppilahti et al reported muscle size recovery in only 30% of patients surgically treated for an ATR,
145 in spite of excellent isokinetic strength results in 73% of the patients [33].

146 Conversely, Valderrabano recently reported that the muscle calf circumference is an easy-to-
147 measure parameter that correlate well with the force that can be exerted by the muscle [17]. Moller
148 et al [19] showed that when calf muscle size is evaluated by means of CT derived cross sectional
149 area, it correlates well with the muscle ability to perform repeated heel rise tests.

150 These apparently conflicting data suggest that probably the assessment technique is an important
151 factor for the validity of the calf muscle size as an outcome to evaluate recovery after ATR.

152

153 *Ankle Range of Motion*

154 Measurements of joints range of motion are common both in clinical and research setting.

155 Ankle ROM is usually used as an indirect measurement of tendon elongation: an increased
156 dorsiflexion after an ATR is assumed to result from a tendon lengthening.

157 Goniometric measurements, both active and passive, in different positions are described [34].

158 Goniometric measurements have been shown to have higher intra-tester reliability than inter-tester
159 reliability [11]

160

161 *Other parameters*

162 In an attempt to propose increasingly valid outcomes, some authors described specific mechanical
163 parameters to evaluate different treatment regimens for ATR. Selvik et al first used Roentgen
164 stereophotogrammetric analysis (RSA) to describe the mechanical properties of a healing Achilles
165 tendon [18].

166 By means of RSA technique Schepull et al calculated early modulus of elasticity of the healing
167 tendon finding a correlation with late functional outcome [13, 35]. Interestingly the authors reported
168 no difference in early mechanical properties between operative and non-operative treatment for
169 ATR.

170 Valderrabano et al [17] recently first used the pedobarographic analysis of plantar pressure
171 distribution as an outcome to evaluate results of different operative techniques for ATR, finding a
172 significant correlation between the push-off force and calf muscle volume measurements.

173 Dynamic pedobarography is an easy-to-measure examination that seems to be a suitable tool to
174 evaluate functional changes following an ATR [36].

175

176 **Multi-Items Scoring Scales**

177

178 These rating systems are important measures of subjective and objective criteria, useful to compare
179 patient's function and different treatment modalities. They may combine subjective (patient's
180 perception of pain and function) or objective (physical examination) data or both.

181 Generally, outcome scales are characterized as global, regional, or disease-specific. Each type of
182 instrument has a unique purpose and has advantages and disadvantages that affect the instrument's
183 potential usefulness.

184 A global scale like the Short Form-36 [37] is designed to be a general assessment tool for health-
185 status; it may be used for different patients and conditions, but it might not capture important
186 aspects of a specific disease. Conversely, disease-specific measures are designed to assess function,
187 pain and disability for specific conditions, with the important advantage of a greater responsiveness
188 when capturing changes of the targeted disease. A region-specific instrument contains items
189 specific to only one body part (i.e. foot and ankle) and can be used with several different disease
190 states affecting this specific region [9,38]

191 Kearney et al [39] performed in 2011 a systematic review of the literature in order to recommend
192 the most suitable outcome scales for the assessment of patients after an ATR. The authors reported
193 21 different multi-item patient outcomes, with the AOFAS hindfoot score being the most frequently
194 used. Of all cited tools, the Achilles tendon Total Rupture Score (ATRS) was the only developed
195 using recognized methodology for outcome measure development [5].

196 A description of some outcome scales commonly used in research studies about ATR treatment is
197 here reported.

198

199 | *The American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Scale (Table 2)*

200 The AOFAS ankle-hindfoot scale has been described by the American Orthopaedic Foot and Ankle
201 society in 1994, in order to provide a universally accepted outcome measure, to compare different
202 methods of treatment in patients with hindfoot problems [40].

203 This clinician-based outcome scale incorporate both subjective and objective factors into numerical
204 scales with a maximum score of 100 points. The subjective portion has been shown to have
205 satisfactory reliability and responsiveness [41].

206 As region-specific system, the AOFAS Ankle-Hindfoot Scale is intended to be used in several
207 hindfoot problems affecting ankle, subtalar, talonavicular and calcaneocuboid joints [40].

208 Then this score is commonly used to evaluate conditions very different from Achilles Tendon
209 Rupture treatment, as ankle arthroplasty, talonavicular arthrodesis or ankle instability [42].

210 Although routinely reported as an outcome measure in studies on patients with Achilles tendon
211 rupture [39, 43], validity and responsiveness have never been evaluated in this specific population
212 [24, 39]. Therefore some authors question its clinical relevance and on the basis of the available
213 evidence this scale cannot be recommended for use in research studies about ATR [11,44].

214

215 *The Achilles Tendon Total Rupture Score ATRS (Table 3)*

216 The ATRS is a patient-reported injury-specific instrument developed in 2007, to specifically
217 evaluate outcome after treatment in patients with ATR [45]. This questionnaire is a self-
218 administered instrument, filled out by the patient and scored by the clinician. The score consists of
219 ten items evaluating aspects of symptoms and function. Each item ranges between 0 and 10 on a
220 Likert scale, with a maximal score of 100 indicating no symptoms and full function.

221 Thanks to its injury-specific nature the ATRS has demonstrated multiple facets of validity for use in
222 the specific ATR patient population [39].

223 The reliability, validity and responsiveness of the ATRS have been evaluated and confirmed outside
224 the developing centre and for languages different from the original version [24,46,47].

225 At present, the best available evidence suggests that the ATRS is the most appropriate outcome
226 measure for evaluating the management of acute Achilles tendon ruptures [11,39].

227

228 | *The Leppilahti Score (Table 4)*

229 Described by Leppilahti et al in 1998, this is the first report of a disease-specific standardized
230 protocol for evaluation of outcome after ATR [48]. This scoring system combines both subjective
231 assessments of the symptoms and objective measures, such as the ankle range of motion and
232 isokinetic calf strength, with a total of seven items giving a sum of 100 points as best possible
233 score.

234 The Leppilahti score is currently reported in several research studies about ATR treatment
235 [21,49,50]. However, a potential limitation for comparison among different studies is the presence
236 in the final score of parameters for the detection of which no consensus has been established, such
237 as strength measurement. [24]

238

239 | *The Foot and Ankle Ability Measure (FAAM) (Table 5 and 6)*

240 This is a self-reported outcome instrument, in the form of questionnaire filled out by the patient,
241 described by Martin et al in 2005 [51].

242 The FAAM is a region-specific instrument divided in two separate subscales, namely activities of
243 daily living and sports activities, divided in 21 and 8 items respectively. The two subscales are
244 scored separately, then summed: a higher score represents a higher level of physical function [51].

245 This scale has been validated for individuals with a broad range of musculoskeletal disorders of the
246 lower leg, foot and ankle, with reported evidence for validity, reliability and responsiveness [28]. In
247 a recent systematic review about clinimetric properties of the outcome scales used to measure lower
248 leg conditions, Shultz et al. reported the FAAM to be one of the most frequently assessed in terms
249 of evidence for responsiveness [38]. Nevertheless FAAM has not been until now evaluated for use
250 in the specific patient population who suffered an ATR.

251

252 **Conclusions**

253

254 A proper outcome evaluation following Achilles tendon rupture is essential to thoroughly
255 understand the effectiveness of available treatment modalities. Actually the use of validated,
256 responsive and reliable rating systems is the only way to allow comparison across practice, helping
257 to draw conclusions about the optimal treatment.

258 The best choice of outcomes tools to report the results of treatment of patients with foot and ankle
259 disorders remains uncertain. Nevertheless, on the basis of the available evidence, the patient treated
260 for an ATR should be assessed with a disease-specific measure, such as the ATRS score, in
261 combination with a generic measure, such as the SF-36. These patient-reported outcome scales
262 focus on the patient's perception of his health status, that has to be considered as the most important
263 indicator of the success of a treatment. Patient-reported outcome scales should also be completed by
264 objective indicators of function, such as strength, endurance and return to previous activity level, to
265 provide a complete picture of the effect of the treatment.

266

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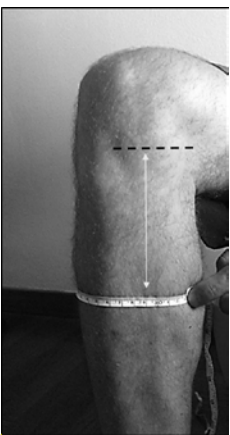
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381 **Fig 1. The Heel Rise Test** - The subject is standing on one leg, maintaining a straight knee; support with the
382 fingertips for balance.

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385 **Fig 2. Calf muscle circumference** - The maximal calf circumference is measured relative to fixed
386 identifiable bony landmarks, e.g. the medial joint line

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394 **Tab 1.** Common reported evaluation instruments following Achilles tendon rupture.

395

| <i>Objective Measures</i> | <i>Multi-items Scoring Scales</i> | |
|------------------------------|-----------------------------------|---|
| | Clinician-Based | Patient-reported |
| - achilles tendon elongation | - AOFAS Ankle-Hindfoot Scale | - Achilles Tendon Rupture Score (ATRS) <i>disease specific</i> |
| - calf muscle size | - Leppilahti Score | - The Foot and Ankle Outcome Score (FAOS) <i>region specific</i> |
| - calf muscle strenght | | - The Foot and Ankle Ability Measure (FAAM) <i>region specific</i> |
| - calf muscle endurance | | - Short Form-36 (SF-36) <i>generic</i> |
| - ankle range of motion | | |
| - AT mechanical properties | | |

396

397

AOFAS Ankle-Hindfoot Scale

| <i>Pain (40 points)</i> | |
|--|----|
| None | 40 |
| Mild, occasional | 30 |
| Moderate, daily | 20 |
| Severe, almost always present | 0 |
| <i>Function (50 points)</i> | |
| Activity limitations, support requirement | |
| <i>No limitations, no support</i> | 10 |
| <i>No limitation of daily activities, limitation of recreational activities, no support</i> | 7 |
| <i>Limited daily and recreational activities, cane</i> | 4 |
| <i>Severe limitation of daily and recreational activities, walker, crutches, wheelchair, brace</i> | 0 |
| Maximum walking distance, blocks | |
| <i>Greater than 6</i> | 5 |
| <i>4-6</i> | 4 |
| <i>1-3</i> | 2 |
| <i>Less than 1</i> | 0 |
| Walking surfaces | |
| <i>No difficulty on any surface</i> | 5 |
| <i>Some difficulty on uneven terrain, stairs, inclines, ladders</i> | 3 |
| <i>Severe difficulty on uneven terrain, stairs, inclines, ladders</i> | 0 |
| Gait abnormality | |
| <i>None, slight</i> | 8 |
| <i>Obvious</i> | 4 |
| <i>Marked</i> | 0 |
| Sagittal motion (flexion plus extension) | |
| <i>Normal or mild restriction (30° or more)</i> | 8 |
| <i>Moderate restriction (15°-29°)</i> | 4 |
| <i>Severe restriction (less than 15°)</i> | 0 |
| Hindfoot motion (inversion plus eversion) | |
| <i>Normal or mild restriction (75%-100% normal)</i> | 6 |
| <i>Moderate restriction (25%-74% normal)</i> | 3 |
| <i>Marked restriction (less than 25% normal)</i> | 0 |
| Ankle-hindfoot stability (anteroposterior, varus-valgus) | |
| <i>Stable</i> | 8 |
| <i>Definitely unstable</i> | 0 |
| <i>Alignment (10 points)</i> | |
| Good, plantigrade foot, midfoot well aligned | 10 |
| Fair, plantigrade foot, some degree of midfoot malalignment observed, no symptoms | 5 |
| Poor, nonplantigrade foot, severe malalignment, symptoms | 0 |

401 **Tab 3.** The *The Achilles Tendon Total Rupture Score (ATRS)*
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Achilles Tendon Total Rupture Score

| | |
|--|------------------------|
| All questions refer to your limitations/difficulties related to your injured Achilles tendon. | |
| <i>Mark with an X the number which matches your level of limitation!</i> | |
| 1. Are you limited due to decreased strength in the calf/Achilles tendon/foot? | 0 1 2 3 4 5 6 7 8 9 10 |
| 2. Are you limited due to fatigue in the calf/Achilles tendon/foot? | 0 1 2 3 4 5 6 7 8 9 10 |
| 3. Are you limited due to stiffness in the calf/Achilles tendon/foot? | 0 1 2 3 4 5 6 7 8 9 10 |
| 4. Are you limited due to pain in the calf/Achilles tendon/foot? | 0 1 2 3 4 5 6 7 8 9 10 |
| 5. Are you limited during activities of daily living? | 0 1 2 3 4 5 6 7 8 9 10 |
| All questions refer to your limitations/difficulties related to your injured Achilles tendon | |
| <i>Mark with an X the number which matches your level of limitation!</i> | |
| 6. Are you limited when walking on uneven surfaces? | 0 1 2 3 4 5 6 7 8 9 10 |
| 7. Are you limited when walking quickly up the stairs or up a hill? | 0 1 2 3 4 5 6 7 8 9 10 |
| 8. Are you limited during activities that include running? | 0 1 2 3 4 5 6 7 8 9 10 |
| 9. Are you limited during activities that include jumping? | 0 1 2 3 4 5 6 7 8 9 10 |
| 10. Are you limited in performing hard physical labor? | 0 1 2 3 4 5 6 7 8 9 10 |

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Tab 4. *The Leppilahti Score*

The Leppilahti Score

| | |
|--|----|
| Pain | |
| None | 15 |
| Mild, no limitations on recreational activities | 10 |
| Moderate, limitations on recreational, but not daily activities | 5 |
| Severe, limitations on recreational and daily activities | 0 |
| Stiffness | |
| None | 15 |
| Mild, occasional, no limitations on recreational activities | 10 |
| Moderate, limitations on recreational, but not daily activities | 5 |
| Severe, limitations on recreational and daily activities | 0 |
| Calf muscle weakness (subjective) | |
| None | 15 |
| Mild, no limitations on recreational activities | 10 |
| Moderate, limitations on recreational, but not daily activities | 5 |
| Severe, limitations on recreational and daily activities | 0 |
| Footwear restrictions | |
| None | 10 |
| Mild, most shoes tolerated | 5 |
| Moderate, unable to tolerate fashionable shoes, modified shoes tolerated | 0 |
| Active range of motion (ROM) difference between ankles | |
| Normal (<6°) | 15 |
| Mild (6°–10°) | 0 |
| Moderate (11°–15°) | 5 |
| Severe (>15°) | 0 |
| Subjective result | |
| Very satisfied | 15 |
| Satisfied with minor reservations | 10 |
| Satisfied with major reservations | 5 |
| dissatisfied | 0 |
| Isokinetic muscle strength (score) | |
| Excellent | 15 |
| Good | 10 |
| Fair | 5 |
| Poor | 0 |

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409 **Tab 5.** *The Foot and Ankle Ability Measure (FAAM) - Activities of Daily Living subscale*

**Foot and Ankle Ability Measure (FAAM)
Activities of Daily Living subscale**

| Please answer every question with one response that most closely describes to your condition within the past week. | | | | | | |
|---|---------------|-------------------|---------------------|--------------------|--------------|-----|
| <i>If the activity in question is limited by something other than your foot or ankle mark not applicable (N/A).</i> | | | | | | |
| Activities | | | | | | |
| Standing | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking on even ground | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking on even group without shoes | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking up hills | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking down hills | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Going up stairs | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Going down stairs | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking on uneven ground | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Stepping up and down curbs | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Squatting | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Coming up on your toes | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking initially | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking 5 minutes or less | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking approximately 10 minutes | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Walking 15 minutes or greater | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Because of your foot and ankle, how much difficulty do you have with: | | | | | | |
| <i>If the activity in question is limited by something other than your foot or ankle mark not applicable (N/A).</i> | | | | | | |
| Activities | | | | | | |
| Home responsibilities | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Activities of daily life | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Personal care | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Light to moderate work (standing, walking) | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Heavy work (pushing/pulling, climbing, carrying) | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Recreational activities | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| How would you rate your current level of function during your usual activities of daily living from 0 to 100 with 100 being your level of function prior to your foot or ankle problem and 0 being the inability to perform any of your usual daily activities? | | | | | | |

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412 **Tab 5. The Foot and Ankle Ability Measure (FAAM) - Sports subscale**

**Foot and Ankle Ability Measure (FAAM)
Sports subscale**

| Because of your foot and ankle, how much difficulty do you have with: | | | | | | |
|--|---------------|-------------------|---------------------|--------------------|--------------|-----|
| <i>If the activity in question is limited by something other than your foot or ankle mark not applicable (N/A).</i> | | | | | | |
| Activities | | | | | | |
| Running | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Jumping | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Landing | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Starting and stopping quickly | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Cutting/lateral movements | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Low impact activities | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Ability to perform activity with your normal technique | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| Ability to participate in you desired sport as long as you would like | No difficulty | Slight difficulty | Moderate difficulty | Extreme difficulty | Unable to do | N/A |
| How would you rate your current level of function during your sports related activities from 0 to 100 with 100 being your level of function prior to your foot or ankle problem and 0 being the inability to perform any of your usual daily activities? | | | | | | |
| Overall, how would you rate your current level of function? | Normal | Nearly normal | Abnormal | Severely abnormal | | |

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