original paper

A comparison of outcome scores in os calcis fractures

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Abstract

Background Of over 20 different scoring systems to evaluate outcome following calcaneal fracture, the Maryland Foot Score has broad current acceptance. A general health survey, the Short Form 36 (SF 36) has also been used.

Aims The study compared two scoring systems for assessing the outcome of open reduction and internal fixation of displaced intra-articular calcaneal fractures.

Methods Over a four-year period, 31 displaced intra-articular calcaneal fractures were categorised by the Sanders classification and treated by open reduction and internal fixation. Outcome was assessed by the Maryland Foot Score and by the Short Form 36 (SF 36) general health questionnaire.

Results Thirty-five per cent of fractures were Sanders class 2, 57% were class 3 and 8% were class 4. The average follow-up was 2.5 years (range 1-4 years). Using the Maryland Foot Score, seven fractures had an excellent result, 13 had a good result, six had a fair result and one was a failure. There was a correlation between pain (coefficient = 0.780, p< 0.001) and physical function (coefficient = 0.638, p< 0.001) with the appropriate sections of the SF 36.

Conclusion The Maryland Foot Score measures what it attempts to measure and therefore it has content validity for pain and physical function. (Ir J Med Sci 2000; 169:127-128)

Introduction

Recent reports suggest that displaced intra-articular calcaneal fractures are best treated by open reduction and internal fixation.[1,2] However, many different operative and conservative protocols have been used to treat intra-articular fractures of the calcaneus with broadly similar results.[3-5] Lack of consensus on the best protocol may reflect different outcome assessment methods.

More than 20 different scoring systems are used to evaluate outcome following calcaneal fracture.[6-8] Both regional (foot and ankle) and general health scoring systems have been reported. The Maryland Foot Score has broad current acceptance and usage[9,10] but this score has not been validated by scientific study. A normal pain-free foot receives a maximum score of 100 using the Maryland Foot Score (Figure 1), 45 points being awarded for pain and 55 points being awarded for function. The functional element of the score has nine parts namely, distance walked, stability of the foot and ankle, support aids, limp, shoes, stairs, terrain, cosmesis and range of motion.

The Short Form 36 (SF36) is a 36-item questionnaire used to measure health status which has been widely used in medicine in general, including orthopaedics,[11-13] and has been validated in large population based surveys.[14,15] It scores physical and social functioning, role limitations due to physical problems, role limitations due to emotional problems, general mental health, energy, bodily pain and general perceptions of health. Scores for each category range from 0 (poor) to 100 (good). One study[8] has reported the use of the Short Form 36 (SF36) to assess outcome in calcaneal fractures although they did not examine the pain and functional elements separately. Individual pain and function elements of the SF36 have recently been used in orthopaedics to validate scoring systems for surgery of the knee,[16] hip[17] and shoulder.[18]

The aim of this study was to compare the Maryland Foot Score and the Short Form 36 as methods of assessment of the results of open reduction and internal fixation of displaced intra-articular calcaneal fractures.

Patients and Methods

Patient Details

Over a four-year period from 1994 to 1998, 31 displaced intra-articular calcaneal fractures in 28 patients were treated by open reduction and internal fixation using a lateral approach (Seattle incision). Three patients were lost to follow-up leaving 27 fractures in 25 patients whose outcome was examined in this study. The average age at the time of injury was 44 years (range 22 to 65 years). Twenty three patients were male. Average follow-up was 2.5 years (range of 1 to 4 years).

Classification of intra-articular fractures

The Sanders CT classification of intra-articular fractures[19] was used to categorise intra-articular fractures as 2, 3 or 4 part displaced. Outcome was assessed by means of the Maryland Foot Score and the Short Form (SF 36) general health questionnaire. Complications of treatment were recorded.

Statistical analysis

Statistical analysis included calculation of the correlation coefficients for the pain component and the physical function components of these two outcome scoring systems.

Table 1. Outcome by Maryland Foot Score

Outcome	Number	Percentage
Excellent	7	26
Good	13	48
Fair	6	22
Failure	1	4
Total	27	100

Results

Pain Score

The pain and physical function components of the Maryland Foot Score and the SF36 were calculated for all patients. The median Maryland Pain Score was 40 (range 5-45). The median SF36 pain score was 84 (range 27-100). The correlation coefficient was 0.78 which was significant (<0.001).

Physical Function Score

The median Maryland function Score was 47 (range 39-55). The median SF36 function score was 83 (range 70 -100). The correlation coefficient was 0.638, which was significant (<0.001).

Outcome by Maryland Foot Score

Results were also categorised as excellent, good, fair and failure according to the Maryland Foot Score system (see Table 1).

Validity

Validity of the Maryland Foot Score was examined by calculating correlation coefficients between the separate pain and function related elements of the Maryland Foot Score and the SF36. There was good correlation between the pain and function elements of the two scoring systems ($p < 0.001$).

Discussion

A universally accepted and validated scoring system is essential for meaningful comparison of literature reports of outcome. This problem has been highlighted and debated in relation to outcome following knee surgery.[13] There are many outcome scores for the foot and ankle in the literature but there is no 'gold standard' outcome measure against which other scoring systems can be compared.[14]

The major scoring systems used to assess outcome after calcaneal fracture have been examined critically by Kerr[7] in an attempt to identify the most relevant variables. He showed that all current scoring systems complied reasonably well with an ideal scoring system. The Maryland foot score tended to rank the more severely affected patients better than other scoring systems. However, Kerr[7] did not compare the existing scoring systems with a widely validated general health outcome instrument. One other study[12] has found good correlation between a foot and ankle scoring system, the Rowe score, and the SF36 in the follow-up of intra-articular fractures.

This is the first study to compare the Maryland Foot Score against a well-validated scoring system. The pain and physical function elements of the Maryland Foot Score correlate well with the pain and function components of the SF36. We conclude that the Maryland Foot Score does indeed measure what it attempts to measure, namely pain and physical function and that therefore it has content validity for pain and physical function.

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