

Functional evaluation of diabetic patients with foot ulcers

Avaliação funcional de pacientes diabéticos com úlceras nos pés

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ABSTRACT

Objective: The objective of this study was to perform a functional evaluation of diabetic patients with plantar ulcers using the American Orthopaedic Foot and Ankle Society (AOFAS) score.

Methods: In this prospective cohort study, 50 diabetic patients treated in an outpatient clinic under conservative management were consecutively evaluated for active ulcers on the foot. The ulcer mean progression time, size and classification and the AOFAS score were evaluated.

Results: Among the sample, 38 (76%) were men, the mean age was 64 years, and the mean body mass index was 28.27 kg/m². The mean ulcer progression time was 9 months, and 40 (80%) patients were classified as Wagner grade 1. There was a significant difference in AOFAS scores between ulcer grades.

Conclusion: The AOFAS score can be used for functional evaluation in diabetic patients with ulcers. However, due to the peculiarities of this population, it is important to search for new and more comprehensive evaluation instruments.

Level of Evidence II; Prognostic Studies; Prospective Study.

Keywords: Foot diseases; Diabetes mellitus; Foot Ulcer; Surveys and questionnaires.

RESUMO

Objetivo: O objetivo deste estudo foi realizar a avaliação funcional dos pacientes diabéticos com úlceras plantares através do escore AOFAS.

Métodos: Neste estudo de coorte prospectivo, foram avaliados 50 pacientes diabéticos consecutivamente com úlceras ativas no pé atendido num ambulatório em tratamento conservador. Foram avaliados o tempo médio de evolução e tamanho das úlceras, classificação das mesmas e o escore AOFAS.

Resultados: Com relação ao gênero, 38 (76%) eram homens, sendo a idade média de 64 anos e o IMC médio de 28,27. O tempo médio de evolução das úlceras foi de 9 meses, sendo que 40 (80%) foram classificadas como tipo 1 de Wagner. A relação entre AOFAS e grau das úlceras mostrou que há diferença significativamente estatística.

Conclusão: O escore AOFAS pode ser utilizado para a avaliação funcional em pacientes diabéticos portadores de úlceras. Entretanto, em virtude das peculiaridades dessa população, é importante a busca por novos instrumentos de avaliação mais abrangentes.

Nível de Evidência II; Estudos Prognósticos; Estudo Prospectivo.

Descritores: Doenças do pé; Diabetes mellitus; Úlcera plantar; Inquéritos e questionários.

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INTRODUCTION

The development of foot ulcers in diabetic patients is one of the most serious complications of diabetes mellitus^(1,2). In general, 15% of diabetic patients will experience this complication throughout their lifetime⁽³⁾, and the incidence increases with increasing disease prevalence and population ageing. A complication associated with non-healing of diabetic ulcers is deep infection involving the bone and generating osteomyelitis (Wagner grade 3), which may ultimately lead to partial or total amputation of the foot and leg⁽⁴⁾.

It is estimated that 85% of non-traumatic amputations are preceded by ulceration complicated with gangrene and infections^(3,4). In addition to the clinical impairment caused by foot ulcers, the economic impact should also be considered^(5,6). Treatment may involve hospitalizations, which are 59% longer in diabetic patients with foot ulcers compared with patients without ulcers⁽¹⁾.

The complexity of the disease combined with its economic impact is responsible for a profound decrease in the quality of life of diabetic patients^(7,8), especially in walking functional impairment, often restricting these patients to a wheelchair and making them dependent on others for daily care⁽⁹⁻¹¹⁾.

The functional evaluation widely used by foot and ankle surgeons is the American Orthopaedic Foot and Ankle Society (AOFAS) score,⁽¹²⁾ which evaluates three major domains: pain, function and walking abnormalities; its score varies from 0 to 100. This score is applied according to the location of the patient's disease: ankle and hindfoot, midfoot, hallux and smaller toes. The score has been translated and validated for the Portuguese language for ankle and hindfoot pathologies^(12,13).

The objective of this study was to functionally evaluate diabetic patients with foot ulcers using the AOFAS score^(12,13).

METHODS

This study was approved by the Ethics Committee with registration in the Brazil Platform under CAAE number: 46121815.0.0000.5463.

The patients included in the study were prospectively and consecutively selected from June to December 2017 and signed a free and informed consent form.

The inclusion criteria were patients with a diagnosis of diabetes and presence of an active ulcer. The exclusion criteria were patients with neurological diseases of the central nervous system (stroke, cerebral palsy, demyelinating

diseases), patients with Charcot neuroarthropathy and Wagner grade 3 ulcers.

The patient data evaluated were gender, age, weight and height, time since diabetes onset, use or not of insulin and time since ulcer onset.

In the physical examination of the foot and ankle, the location on the foot, size (area in cm²) and depth of the ulcer were evaluated.

The specific AOFAS score was applied according to the location of the ulcer on the foot.

The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS, Inc., Chicago, IL), version 23.0. The numerical variables are expressed as the mean, standard deviation, maximum and minimum, and descriptive statistics are used for categorical variables.

The correlation between the AOFAS score and ulcer size and between AOFAS score and time since ulcer onset was analysed using the Spearman test⁽¹⁴⁾.

The comparison between the AOFAS score and ulcer grade was performed using the Mann-Whitney U test⁽¹⁵⁾.

RESULTS

The sample consisted of 50 patients, of both genders, 12 (24%) female and 38 (76%) male. The mean age was 64 years (44-88 years, standard deviation (SD)=8.03), and the mean body mass index (BMI) was 28.27 kg/m² (22.09-39.85). Of the total sample, 27 patients were insulin-dependent (54%), with a mean treatment time of 10 years. Regarding laterality, 28 patients had ulcers on the right foot (56%) and 22 on the left foot (44%). The ulcer progression time was 9 months (1-204 months), and the mean ulcer area was 2.96 cm² (0.4-16 cm²).

Regarding the ulcer grade according to the Wagner classification⁽¹⁴⁾, 40 patients presented grade 1 ulcers (80%), while 10 presented grade 2 ulcers (20%). The mean AOFAS score was 60.24 (48-80, SD=9.56). The correlation between the AOFAS score and ulcer grade according to the Mann-Whitney U test⁽¹⁵⁾ showed a significant difference ($p < 0.0001$) in AOFAS score between ulcer types. The correlation between AOFAS score and ulcer size was significantly negative ($p = 0.011$) according to the Spearman test⁽¹⁴⁾ (correlation coefficient = -0.357) (Figure 1). The same test showed that there was no significant correlation ($p = 0.936$) between the AOFAS score and the time since ulcer onset (correlation coefficient = 0.012).

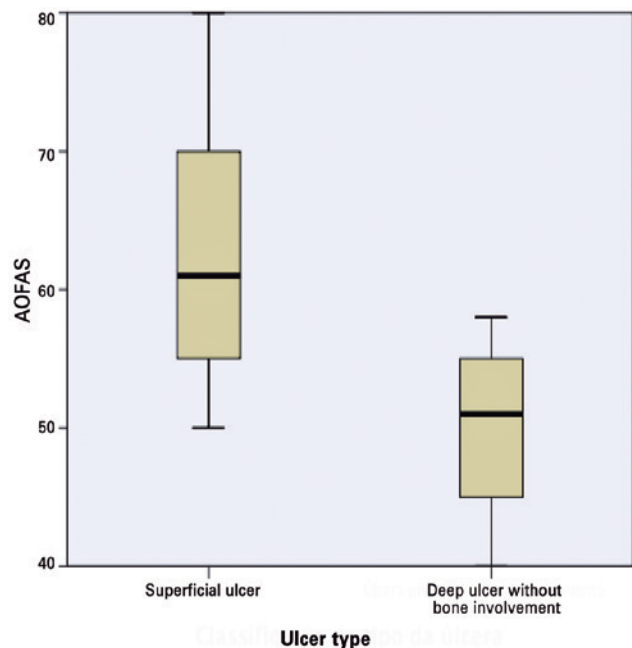


Figure 1. Distribution of AOFAS scores between ulcer types.
Source: Prepared by the author based on the results of the study.

DISCUSSION

The literature is clear when describing the psychological and financial burden experienced by diabetic patients with plantar ulcers⁽⁸⁾, which can be explained by the socioeconomic impact of the disease due to the increased number and duration of hospital admissions in this population^(5,6) and expenses associated with caregivers, transportation, footwear and structural adaptations in the dwelling⁽⁶⁾.

The costs are influenced by interventions to prevent the development of ulcers, strategies to reduce healing time, prevention of amputations in patients with active ulcers and management of functional limitations due to the disease⁽⁸⁾.

The AOFAS functional score ranges from 0-100, and the mean score found in diabetic patients with ulcers was 60. Because of the considerable morbidity of these cases in addition to the impairment in daily life activities of this population, the functional impact found was not significant.

Some factors may be related to this false positive finding. Regarding the pain domain, diabetic patients develop ulcers in the advanced stage of neuropathy, and pain sensitivity at this stage is already compromised⁽¹⁶⁻¹⁸⁾. Because pain sensitivity is compromised, a misinterpretation of the absence of pain may result. At the other extreme, neuropathic pain, which is also common in these patients, can distort the assessment of foot ulcers⁽¹⁹⁾.

The evaluation of shoe use by the AOFAS score was also impaired, since most patients with ulcers use shoes for insensitive feet with full contact insoles and not regular fashion footwear.

In the evaluation of the distances patients were able to walk, there was also a bias because diabetic patients with ulcers are instructed to restrict themselves to activities of daily living, often because of the impossibility of placing load on the site of the ulcer^(20,21).

The correlation between ulcer depth and the AOFAS score was significant; that is, smaller AOFAS scores were found in patients with grade 2 ulcers. Therefore, grade 2 ulcers had more functional impact than grade 1 ulcers. However, there was no correlation between the AOFAS score and either ulcer size or time since ulcer onset. In outpatient consultations, patients report that a longer ulcer duration results in greater anxiety, ultimately impacting the function of these patients.

Therefore, due to the peculiarities of diabetes mellitus, the AOFAS score did not adequately assess the functional impact caused by ulcers in these patients, and no correlations were found between the score and ulcer size or the time since onset.

CONCLUSION

The mean AOFAS score in patients with grade 1 and 2 ulcers was 60 and was inversely proportionally correlated with ulcer depth. However, as the pain domain in these patients may be underestimated and the distance walked and footwear use are compromised, new assessment instruments are needed that are able to quantify more comprehensive aspects related to the peculiarities of diabetes mellitus.

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