Choosing a set of instruments to point out the diabetic at risk for foot ulceration. Results from the Rotterdam Diabetic Foot Study.

Willem D. Rinkel MD, Erwin Birnie PhD, Johan W. Van Neck PhD, J. Henk Coert MD, PhD

Departments of Plastic-, Reconstructive- and Handsurgery, Erasmus Medical University, Franciscus Gasthuis, Utrecht Medical University, the Netherlands

Introduction

The aim of this study is to assess how the various diagnostic tools and sites discriminate between patients who had an ulcer in their medical history and patients that did not. Knowledge of these values may help to identify patients at risk for foot ulceration.

Methods

We determined the sensation of the feet of 399 patients. We distinguished three groups: diabetic ulcer and amputation (DU+); diabetic ulcer without amputation (DU-) and no ulcer (controls). 55 patients (13.8%) had an ulcer in their history and 11 of them underwent an amputation. The tuning fork tested the vibration threshold on two sites of each feet (dorsal distal hallux and medial malleolus). Cutaneous threshold (one-point static discrimination, (S1PD) was tested on five locations (pulp of 1st and 5th toe, medial heel (above callus), first web and lateral foot) of each foot with monofilaments ranging from 0,008–300 grams. Innervation density (two-point static and moving discrimination (S2PD, M2PD) was assessed on the same test locations. Neuropathy complaints were assessed using the Michigan Neuropathy Screening Instrument (MNSI).

Results

S2PD in DU-: median 16 (range 3- >16, varying across feet and locations), DU+: median >15 (range 8- >15, idem) and controls: median 11-14 (range: 2- >15, idem). M2PD in DU-: median 13- >15 (range 2- >15, idem), DU+: median > 15 (range 4- >15, idem) and controls: median 8-10 (range 2- >15). The cutaneous threshold was 26-fold increased in the ulcer group and 209-fold increased in the amputation group vs. control. Vibration perception was diminished (DF-) group) or absent (DF+). Complaints (MNSI >7) were higher in the ulcer (40.9%) and amputation groups (54.4%) compared to controls (8,7%), with more negative symptoms (such as numbness) reported in the DF+ and DF- (81.8% vs. 54.5%), compared to controls (22.5%).

Conclusion

Patients with DF-/+ in their history more frequently have a S2PD >15, an increasing cutaneous threshold, a decreasing vibration sense and more negative and positive symptoms of DSP. Only one or two test locations need to be tested on one foot to make a statement about the contralateral foot, to make a proper risk assessment of the patient in general. The prognostic value of these test values will be studied in the follow-up in the Rotterdam Diabetic Foot Study.