How To Prevent Foot Ulcers In Diabetic Patients

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ABSTRACT

The prevalence of development of foot ulcers in diabetic patients is 4% to 10%, these ulcers may be infected, cause morbidity and may lead to lower extremity amputation.

Objective: Prevention of diabetic foot ulcers in patients known to be diabetics by fasting blood sugar (FBS), HbA1C tests.

Material and Methods: The study was done on 120 patients between March 2010 and July 2011 diagnosed as diabetics and they performed simple screening tests for peripheral neuropathy (Semmes-Weinstein monofilament examination (SWME), superficial pain, vibration testing by the on-off method, the timed method). Nerve conduction studies (NCS) were used as standard criterion for detection of neuropathy, they also underwent Doppler ultrasound and ankle-brachial pressure index (ABPI) measurement to assess the vascularity of their lower limbs.

All patients were given proper education to prevent foot ulcers, including optimising glycemic control, cessation of smoking, debridement of calluses, appropriate foot wear and foot care with periodic foot examination.

Results: In our study we succeeded in increasing the prevention of foot ulceration in our diabetic patients by 95%, compared to results achieved with the previous measures.

Conclusion: Screening tests are effective for all diabetic patients to identify patients at risk of foot ulceration. They may benefit from prophylactic interventions including, optimising glycemic control, cessation of smoking, debridement of calluses, appropriate foot wear and intensive foot care.

Also, we take care of patients with low risk of foot ulceration by adequate foot care and periodic foot examination to prevent foot ulceration.

INTRODUCTION

Among diabetics, 15% are at risk of developing foot ulcers[1]. Annual incidence ranges between 1% to 4.1%[2] and prevalence is between 4% to 10%[3-4]. Diabetic foot problems are one of the commonest causes of admission to hospital for diabetic sufferers, and diabetics are affected more than non diabetics[5]. Foot ulcers affect the physical and emotional state of diabetic persons and can lead to financial losses[6-9].

Foot ulcers lead to limb amputation 10 to 30 times more in diabetic persons than in the general population[10-11]. The mortality rate ranges from 13% to 40% post amputation at 1 year, and 39% to 80% at 5 years[12]. This study aimed to evaluate the efficacy of the identification of diabetics at high-risk of developing foot ulcers, and how to prevent them.

PATIENT AND METHODS

The study was performed on 120 patients diagnosed as diabetics between March 2010 to July 2011 in Fayoum University Hospital. Medical history was taken, all patients' feet were examined for structural abnormalities (e.g. flat feet, calluses, bunions, hammer or claw toes), dry or fissured skin, reduced joint mobility and fungal infection inbetween toes. Inspection of foot wear was done to ensure proper fit and examination for arterial supply was done for all patients, then screening for protective sensation loss was done by simple screening tests for peripheral neuropathy (Semmes–Weinstein Monofilament examination (SWME) 10g, vibration testing by on-off method and by the timed method and superficial pain test); nerve conduction study (NCS) was used as a standard criterion for peripheral neuropathy in all patients.

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In SWME, 10g monofilament was used and applied bilaterally on the plantar aspect of both feet, testing the plantar aspect of the big toe, the third, the little toe, the mid part of the foot and heel and was repeated four times.

Vibration test using the on-off method and the timed method was carried out using a 128 –Hz tuning fork using which was applied to the dorsum of the big toe at the bony prominence just proximal to its nail bed. A superficial pain test was conducted using a sterile neurotip, which was applied four times at the same sites described in SWME. Laboratory tests as fasting blood sugar, glycated Hb (HbA1C) were done for all patients.

Assessment of lower limb vascular status with Doppler ultrasound and ankle brachial blood pressure indices were also carried out for all patients. One hundred cases were diagnosed as having peripheral neuropathy by simple screening tests and NCSs at different degrees. Twenty cases were without peripheral neuropathy and they have a short duration for diabetes. The 100 cases with peripheral neuropathy were instructed to receive more frequent follow-ups, in order for foot examinations to be carried out.

All patients (120 patients) performed the following:

1. Optimisation of the glycemic control with measuring HbA1C.
2. Smoking cessation for all smokers.
3. Frequent foot examinations for any structural deformities, loss of sensation and for any diminished pulse.
4. Prescription of adequate footwear for high-risk groups with wide deep box, in order to redistribute pressure over a greater surface area with proper fit.
5. Debridement of calluses to reduce pressure that may cause ulceration.
6. Annual foot screening examination with our surgery clinic (for those in the low-risk group).
7. Engagement in a simple daily foot care routine; washing, drying especially between toes, moisturising the feet.

Follow-up was at 6 months and 12 months, 80 cases and 40 cases, respectively, were lost at follow up.

RESULTS

Of the 120 patients, there were 61 females (50.8%) and 59 males (49.2%), the mean age at diagnosis was 52.2 ±4.8 (range 22 - 85 years). Diabetic laboratory tests have been done for all patients in the form of fasting blood sugar, HbA1C. Screening tests for peripheral neuropathy, NCSs were done for all patients.

115 patients (95.8%) were diagnosed with peripheral neuropathy, 5 patients (4.2%) were without peripheral neuropathy, ankle brachial pressure index (APBI) were done for all patients to assess the vascularity of the lower limbs, there were 22 patients with impaired vascularity by Doppler, ABPI and they were treated conservatively.

At 12-month follow-up, 4 patients (5%) developed superficial foot ulcers that were healed by repeated dressings and antibiotics. Mean hospital stay in patients who developed ulcers was longer than non-developed ulcers patients, 14 ±3 vs 3 ±1 days; p < 0.01. In our study we succeeded to prevent foot ulceration in our diabetic patients (95%) by the previous measures.
DISCUSSION

For prevention of diabetic foot ulcers, screening tests for protective sensation loss with brief history, assessment of the vascular status of the lower limbs with ankle-brachial pressure index, Doppler ultrasound. All these measurements along with physical examination help clinicians to define patients at high-risk of diabetic foot ulcer development and how to prevent it. Also in our study we defined the low-risk patients (those with short duration of diabetes and with normal screening tests for sensation and with normal vascularility) and educated them how to prevent the development of foot ulcers as mentioned before and how to maintain a daily foot care routine.

The percentage of reduction of foot ulceration in our study was 95% compared to other studies, which was 57% with optimising glycemic control[12], 57% with smoking cessation[13], 58% with frequent foot examination and by the effect of wide deep-toe box shoes with ample padding[14,15].

In our study, the mean hospital stay in cases developed ulcers was 14 ±3 days vs 24 ±2 days in other studies[16].

CONCLUSION

The risk of diabetic foot ulcers may be reduced by appropriate screening and some interventional measures. Patients with diabetes should be screened to identify patients with risk of diabetic foot ulceration. This occurs by taking relevant past history, any current foot problems or deformities should be identified, examination for loss of sensation by monofilament, vibration testing and superficial pain, also peripheral vascular assessment by ABPI measuring and Doppler ultrasound.

The patient should be with optimal glycemic control, cessation of smoking, frequent foot examination for any structural deformities or diminished pulses, adequate footwear, and calluses debride-ment, all these measures give the best prevention of diabetic foot ulceration in high-risk diabetic patients. Also patients at low-risk should be educated how to prevent the development of foot ulcers.

REFERENCES