UNIT NO. 2

SCREENING FOR COMPLICATIONS IN THE OFFICE SETTING

Dr Jean Tan Su Ming

ABSTRACT

Diabetic patients are more likely than the general population to suffer from blindness, renal failure, myocardial infarct and a lower limb amputation, and these result from the complications of diabetes mellitus. The aim is, therefore, for Family Physicians to pick up the complications as early as possible, so as to avoid as far as possible or at least delay the onset of these complications and the attendant problems associated with them. The complications screened for among the type 2 diabetic patients in my general practice are: retinopathy; microalbuminuria; diabetic foot changes as the result of neuropathy, macro-angiopathy and microangiopathy; and ischaemic heart disease and cardiovascular risk factors. Retinopathy, microalbuminuria, and ischaemic heart disease are screened for at time of diagnosis and yearly thereafter, unless there is indication to do it more frequently. Diabetic foot screening can be done at every visit, particularly to those with diminished circulation.

SFP2007; 33(1): 13-16

INTRODUCTION

We know that diabetic patients are more likely than the general population to suffer from blindness, renal failure, myocardial infarct and a lower limb amputation, and these result from the complications of diabetes mellitus.

The aim is, therefore, for Family Physicians to pick up the complications as early as possible, so as to avoid as far as possible or at least delay the onset of these complications and the attendant problems associated with them.

The complications that I screen for among the diabetic patients (which are exclusively Type 2) in my general practice are:

- Retinopathy
- Microalbuminuria
- Diabetic foot changes as the result of neuropathy, macro-angiopathy, and microangiopathy, and
- Ischaemic heart disease and cardiovascular risk factors.

RETINOPATHY

When to screen?

Screen for this at the point of diagnosis. This is in accordance with the MOH clinical practice guidelines (MOH, 2006)[1] and other guidelines such as the one issued by the American Diabetes Association (ADA, 2006)[2]. Subsequent eye screening should be done yearly (Fong et al, 2005)[3] or more frequently if abnormalities are present.

JEAN TAN SU MING, Private Medical Practitioner, Changi Clinic

I check the visual acuity for each eye using the standard eye chart first. The standard direct opthalmoscope after dilation with tropicamide 1% eye drops (it takes 20 minutes to dilate the pupils) is used. The effect of the eye drop will wear off after about three hours.

For patients that I have difficulty doing a satisfactory fundal exam with (for example, as the result of cataracts), I refer them to an ophthalmologist for a comprehensive eye examination.

For patients who do not have cataracts, but for whom I still could not do a satisfactory fundal examination, I had their retinal photographs taken by the MDRP(Mobile Diabetic Retinal Photo) team from the Eye Institute in NHG. This team consists of an Imaging Specialist and a staff nurse, that set up the equipment in my clinic in my 2nd consultation room. The cost for the DRP session is $45/hour (before GST). The team follows up about a fortnight later with the retinal report and retinal photo of the patient screened.

There is also a new generation nonmydriatic or Pan optic opthalmoscope by Welch Allyn which allows viewing of the retinal fields without dilation and is said to give a better visualisation of the fundus. This has been available in Singapore for about 2 years now and costs between S$1,200 – 1,700.

When to refer?

If I pick up no abnormality, I repeat the fundal examination in a year. If I detect retinopathy, even if it's nonproliferative, I usually refer to an ophthalmologist for follow up, rather than repeating the check 6 monthly.

Practice tips

- I have recently learnt that even a trained ophthalmologist would not pick up as much as a retinal photo can, and thus will miss things. So, it is recommended that every diabetic patient is screened at least once yearly by the retinal photography if there is no abnormality detected in the previous screen.
- Patients with a history of closed angle glaucoma should have their fundi checked by non-myrdiatic means. Epidemiologically, these patients are usually elderly patients. A crude screen for glaucoma is to check the depth of the anterior chamber before instilling the Tropicamide eye drops.

NEPHROPATHY

When to start screening?

Since there is a long asymptomatic duration of abnormal glucose metabolism that often precedes diagnosis, patients with type 2 diabetes are more likely to have microalbuminuria

or even overt nephropathy at diagnosis. Thus, it has been found that 7% of people screened at the time of diagnosis will have albuminuria (Gross et al, 2005; Adler et al, 2003)[4,5]. Nephropathy screening should be done at the time of diagnosis.

Diabetic nephropathy presents in its earliest stage with microalbuminuria, which has been reported to be an early predictor of the development of glomerular damage in the absence of overt nephropathy. After the initial screening for albuminuria, this should be done annually thereafter (MOH, 2006)[1].

How to Screen?

I measure the albumin-to-creatinine ratio on a spot urine test on a single-void specimen. I use the Microalbustix from Bayer which costs $2.8/test strip and comes in a bottle of 25 strips. Testing 3 samples over a 3 to 6 month period may increase the positive predictive value. Two positive samples are predictive of incipient nephropathy. A ratio of 30mg albumin per 1g creatinine is considered elevated.

Limitations of this test

The presence of blood or soap, skin cleansers or talcum powder can affect the results, including hyperglycaemia, febrile illness and heart failure. Patients with overt nephropathy do not need screening for microalbuminuria because the level of protein in the urine is high enough to be detected on routine dipstick urinalysis. I try to check the serum urea and creatinine at least once yearly. In patients with rising creatinine values, I try to tail off or take off their Metformin if they are on it depending on how high or how rapidly the serum creatinine level is increasing. I either add arcarbose or insulin in the place of metformin.

Practice tips

- Consider stopping metformin once the serum creatinine is above the upper limit of normal (the upper limit has recently been lowered by most laboratories).
- If the creatinine is just slightly elevated, one may keep the metformin on, but track the creatinine level carefully (at least 2 to 3 times a year).
- It is empirical but safe practice to stop metformin if the creatinine climbs above 150umol/L or 1.7mg/dl.

DIABETIC FOOT

The vast majority of diabetic foot complications resulting in amputation begin with formation of skin ulcers. Early detection and appropriate treatment of these ulcers will prevent amputations.

The most important risk factors for ulcer formation and lower extremity amputation are diabetic neuropathy and peripheral arterial disease (PAD).

Appropriate care of the diabetic foot requires recognition of these risk factors and they can be identified based on specific aspects of the history and a brief but systematic examination of the foot.

Peripheral arterial disease

PAD is 4 times more prevalent in diabetics than non diabetics. Indicative symptoms are claudication, and/or pain occuring at night. Indicative signs are thinned or shiny skin, absence of hair on the lower leg and foot, thickened nails, redness of the affected when the legs are dependent, and absent popliteal or posterior tibial pulses.

I don't have the office set up to perform non invasive vascular tests like the ankle-brachial index or absolute toe systolic pressure.

Sensory Neuropathy

Distal symmetric polyneuropathy is the most common form of neuropathy affecting the lower extremity of patients with diabetes mellitus. It results in a lack of the protective sensation of pain in response to a noxious stimulus. The consequence is that minor injuries, or ischaemia from pressure continues to damage the foot without the patient being aware of it until it is too late.

The nylon monofilament test is a simple office test to diagnose patients at risk of ulcer formation due to peripheral sensory neuropathy. The test is abnormal if the patient cannot sense the touch of the monofilament when it is pressed against the foot with just enough pressure to bend the filament (Table 1 and Figure 1). The monofilament can be purchased from some medical supply outlets.

Table 1. Use of 10g Monofilament

Sensory examination should be done in a quiet and relaxed setting to help the patient be fully attentive to the testing procedure.
Explain the testing procedure to the patient.
First apply the monofilament to the patient's inner wrist so that the patient knows what to expect.
The patient should not be able to see if and where the examiner applies the filament.
Apply the filament perpendicular to the skin surface.
Apply sufficient force to cause the filament to bend or buckle.
The total duration of the approach, skin contact and removal of the filament should be approximately 1.5 to 2 seconds.
Do not apply the filament on sites with callus, corn, ulcer, scar or necrotic tissue.
Do not allow the filament to slide across the skin or make repetitive contact with test sites.
Explain to the patient the required procedure of answering yes/no if they feel the pressure applied and next where they feel the pressure applied (left/fight foot). Non verbal patients may tap/clap lightly when pressure is felt.
Responses delayed more than 3 seconds should be recorded as a negative response.

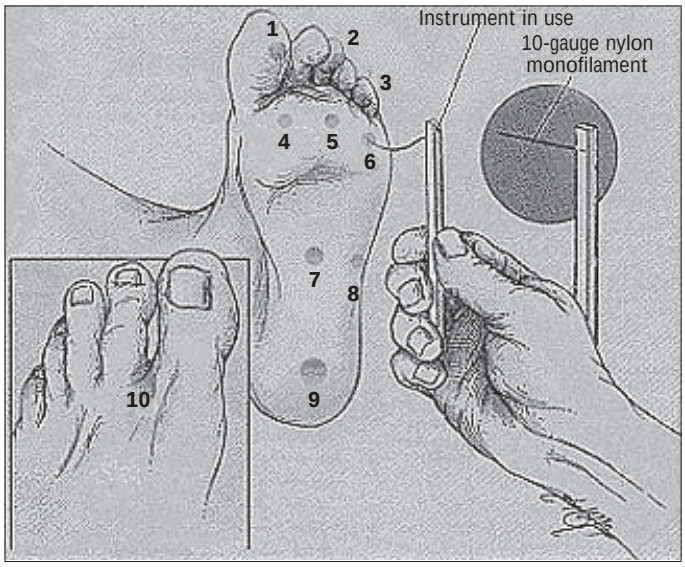

Fig 1: Nylon monofilament test. There is a risk of ulcer formation if the patient is unable to feel the monofilament when it is pressed against the foot with just enough pressure to bend the filament. The patient is asked to say "yes" each time he or she feels the filament. Failure to feel the filament at four of 10 sites is 97 percent sensitive and 83 percent specific for identifying loss of protective sensation.

Structural Deformity

We can eyeball the feet and look for potential trouble there. Refer the patient to the podiatrist if it is beyond your expertise to manage the structural deformities. Assess the patient routinely for the following structural abnormalities:

Corns and Calluses

If neglected, these may develop into ulcers. When they are detected early, I pare them myself, or refer them to a podiatrist if it's too complicated for me to pare.

Dry cracked skin

This results from both poor circulation and autonomic neuropathy with an auto-sympathectomy-like state. It may break down to become an ulcer.

Nail Disorders

Ingrown toe nails or fungal infection of the nail can lead to infections such as cellulitis.

Infected or macerated web spaces

This may be missed if the examination is cursory. Look in between the web spaces of the toes. Left unattended, it will be a potential trouble.

Hammertoes and Bunions

These are the result of motor neuropathy leading to significant muscle wasting and imbalance of the intrinsic muscles of the feet. If untreated, these deformities also lead to ulceration on the pressure bearing areas where the toe or bunion impinge on footwear.

Charcot foot

In our local setting it is rare that one encounters one of these. Consider the diagnosis if the patient has a deformed and disorganised foot that is totally painless. The loss of sensation results in the total disorganisation of the architecture of the foot. The painless disorganised foot is prone to ulceration.

How often should the foot be inspected?

Without the monofilament test, screening visually for deformities, corns, calluses, other structural deformities, and checking for peripheral pulses actually takes very little time. Hence, I try to do a foot examination at each visit, particularly if the peripheral circulation is diminished. The MOH clinical practice guidelines state that all individuals should receive an annual foot examination to identify high risk foot conditions (MOH, 2006) [1].

CORONARY HEART DISEASE AND RISK FACTORS OF MACRO-ANGIOPATHY

A baseline ECG

This is done at the time of diagnosis of Diabetes mellitus. I usually do not do it again unless symptoms referable to ischaemic heart disease appear. This is in line with the MOH clinical practice guidelines (MOH, 2006) [1].

Yearly lipid panels

These will pick up patients with abnormal lipid profiles so the abnormalities can be corrected early with or without drugs. The aim is to have an ideal-as-possible lipid profile and in this way, reduce one risk factor for a coronary event.

PARTING SHOT

Screening for the entire list of complications can be too much for one visit. But spread over different visits, it is possible to screen for nearly all the complications over the course of a year.

ACKNOWLEDGEMENTS

Thanks are due to Prof Peter Hwang, A/Prof Goh Lee Gan, Drs Peter Eng, Christine Khoo, Wong Hon Tym, Yap Soo Keong, Tan Hwee Huan, Ong Chooi Peng, and Lim Su Chi for their valuable inputs.

USEFUL WEBSITES

URL of websites I checked out in doing research for this article:

http://www.aorn.org/journal/homestudy/aug02a.pdf

http://www.aafp.org/afp/980315ap/armstron.html

REFERENCES

1. MOH. Diabetes mellitus. Clinical Practice Guidelines 2/2006.
2. ADA. Standards of medical care in diabetes – 2006. Diabetic Care. 2006 Jan;29(Supp 1):S4-42.
3. Fong DS, Aiello LP, Ferris FL 3rd, Klein R. Diabetic retinopathy. Diabetes Care. 2004 Oct;27(10):2540-53.
4. Gross JL et al. Diabetic nephropathy: diagnosis, prevention, and treatment. Diabetes Care 2005 Jan;28(1):164-76.
5. Adler AI et al. Development and progression of nephropathy in type 2 diabetes: the United Kingdom Prospective Diabetes Study (UKPDS 64). Kidney International 63: 225-32, 2003.

LEARNING POINTS

- **Diabetic patients are more likely than the general population to suffer from blindness, renal failure, myocardial infarct and a lower limb amputation.**
- **The complications screened for among the type 2 diabetic patients are retinopathy, microalbuminuria, diabetic foot changes, ischaemic heart disease and cardiovascular risk factors.**
- **Retinopathy, microalbuminuria, and ischaemic heart disease are screened for at time of diagnosis and yearly thereafter, unless there is indication to do it more frequently.**
- **Diabetic foot screening can be done at every visit particularly in those with diminished circulation**