The Management of Diabetic Retinopathy

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Diabetes mellitus is a very common disease and can affect the eye in many ways:

1. Diabetic retinopathy
2. Others: transient blurring if blood glucose level is too high or too low; cataract; retinal vein/ artery occlusion (branch and central); non-arteritic ischaemic optic neuropathy; cranial nerve palsies (esp. CN VI); increased risk of primary open angle glaucoma; increased risk of infection: cellulitis, endogenous endophthalmitis etc.

Epidemiology of diabetic retinopathy

Diabetic retinopathy (DR) is the most common complication of diabetes mellitus. It affects 40% of type I diabetics and 20% of type 2 diabetics (regardless of whether controlled with diet or with oral hypoglycemics). The prevalence increases with duration of disease. After 20 years, almost all type 1 diabetics and 60% of type 2 diabetics are affected. Other factors which increase the risk of DR include:

1. Diabetic control
   - Diabetic Complications Control Trial: showed intensive blood glucose control in type 1 diabetics slowed DR progression
2. Others: renal disease, systemic hypertension, hyperlipidemia, pregnancy

Pathogenesis

Diabetes affects the microvasculature, causing microvascular occlusion and leakage:

- Occlusion leads to retinal ischaemia & hypoxia, which in turn cause the formation of nerve fibre layer infarcts (cotton wool spots), abnormal arterio-venous shunts (intraretinal microvascular abnormalities, IRMA) and neovascularisation
- Leakage leads to retinal haemorrhage, oedema and lipid exudation

Classification

DR can be classified into maculopathy and retinopathy, which affects the rest of the retina. The two problems usually, but not always, co-exist.

1. Retinopathy: mild, moderate (background DR); severe (pre-proliferative); proliferative
   - If untreated can lead to: vitreous haemorrhage, neovascular glaucoma, tractional retinal detachment
2. Maculopathy: affects 10% of all diabetics. Main cause of visual impairment

Clinical examination

1. Requires pupil dilatation
2. Using direct or indirect ophthalmoscope; or slit-lamp with fundus lens (90D or 78D) or photoscreening

Signs of Diabetic Retinopathy

a) Mild: 1 microaneurysm
b) Moderate (Figure 1): microaneurysm, dot/ blot haemorrhage, cotton wool spots, hard exudates (not to extent of severe)
c) Severe (Figure 2) [4-2-1 rule]: haemorrhages & microaneurysms in 4 quadrants, venous beading in 2 quadrants, IRMA in 1 quadrant
d) Proliferative (Figure 3): neovascularisation at the disc (NVD) or elsewhere (NVE)
e) Macular oedema: Clinically significant macular oedema (CSME) is threshold of treatment according to the Early Treatment of Diabetic Retinopathy Study. Definition of CSME:

- Retinal thickening located <500microns (1/3 disc diameter, DD) from the foveal avascular zone, FAZ
- Hard exudates with retinal thickening <500microns from center of FAZ
- Retinal thickening ≥1 disc area within 1 DD of FAZ
Investigations

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<tr>
<th>Investigations</th>
<th>Pros</th>
<th>Cons</th>
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<tr>
<td>Fluorescein Angiography</td>
<td>Gold standard</td>
<td>Invasive, small risk of hypersensitivity, caution in patients with renal impairment</td>
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<td>(Figure 4)</td>
<td>Shows oedema and ischaemia</td>
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<tr>
<td>Optical Coherence Tomography</td>
<td>Good for macular oedema</td>
<td>Only covers one small area at a time</td>
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<tr>
<td>(Figure 5)</td>
<td>Fast, Non-invasive</td>
<td>Does not show ischaemia</td>
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<tr>
<td>Fluorescein Angiography (Figure 4)</td>
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<td>Optical Coherence Tomography (Figure 5)</td>
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Treatment

a) Prevention is better than cure: Early diagnosis of diabetes; DR asymptomatic screening; diabetic control (aim HbA1C<7%); control hypertension, renal disease, hyperlipidemia; stop smoking
b) Proliferative DR with high risk features: pan-retinal photocoagulation. (Figure 6)
   i. NVD ≥ 1/3 disc area
   ii. NVD with vitreous or pre-retinal haemorrhage
   iii. NVE ≥ 1/2 disc area with vitreous or pre-retinal haemorrhage
c) Macular Oedema (CSME)

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<tr>
<th>Treatment Options</th>
<th>Pros</th>
<th>Cons</th>
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<tr>
<td>Macular laser (Grid/focal) (Figure 7)</td>
<td>Gold standard</td>
<td>Few patients gain vision after laser. VA improvement only demonstrated in the first 2 years after grid laser. Complications possible e.g. macular scarring</td>
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<td>Reduces risks of visual loss &amp; persistent macular oedema.</td>
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<td>Intravitreal triamcinolone (ivTA)</td>
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When to screen? (Recommended by the American Academy of Ophthalmologists)

a) When diabetes is first diagnosed, dilated fundal examination should be performed (even if asymptomatic)
   - Within 5 years of diagnosis if patient is ≥ 29 years old;
   - Within a few months of the diagnosis if patient is ≥ 150 years old
   - Subsequent yearly or more frequent follow-up
b) Pregnant women with diabetes: in the first trimester

When to refer to an ophthalmologist?

1. Asymptomatic Screening
2. Prompt eye referral if visual disturbance:
   a) Affects only one eye
   b) Lasts more than a few days
   c) Is not associated with a change in blood sugar level.
MCHK CME Programme Self-assessment Questions

Please read the article entitled "The Management of Diabetic Retinopathy" by Dr. Carmen Chan and complete the following self-assessment questions. Participants in the MCHK CME Programme will be awarded 1 CME credit under the Programme for returning completed answer sheet via fax (2865 0345) or by mail to the Federation Secretariat on or before 28 February 2006. Answers to questions will be provided in the next issue of The Hong Kong Medical Diary.

Questions 1-5: Please choose the best answer.

1. **Diabetic retinopathy**
   a. Is more common in type 2 diabetics
   b. Affects 50% of type 1 diabetic after 20 years of disease
   c. Does not affect type 2 diabetics who are only on diet control
   d. Progression is related to systemic diabetic control
   e. Progression is slower during pregnancy

2. The following are features of mild or moderate diabetic retinopathy, except
   a. Cotton wool spots
   b. Venous beading
   c. Intra-retinal microvascular abnormalities
   d. Dot and blot haemorrhage
   e. Microaneurysms

3. **Examination and investigations for diabetic retinopathy**
   a. Dilated fundal examination is always safe
   b. Fluorescein angiography (FA) is always safe
   c. Optical coherent tomography (OCT) is non-invasive
   d. OCT shows both macular oedema and ischaemia
   e. FA shows retinal edema only and not ischaemia
4. Treatment for diabetic macular oedema
a. Intravitreal triamcinolone may reduce macular oedema more effectively than macular (grid or focal) laser in the short term
b. Macular laser can usually improve a patient’s vision
c. Intravitreal triamcinolone is an established first line treatment for diabetic maculopathy
d. Macular laser is always a safe procedure
e. Intravitreal corticosteroid does not cause an increase in intraocular pressure

5. The following statements are TRUE, except:
a. Diabetic patients should undergo asymptomatic retinal screening
b. Diabetics with a sudden drop in vision in one eye warrants a prompt referral to an ophthalmologist
c. Patients who are 1st diagnosed with diabetes 29 years old, should receive a dilated fundal examination within 5 years from diagnosis
d. Pregnant diabetic patients only needs to see an ophthalmologist if they develop visual symptoms
e. Fluctuations in blood sugar levels can cause transient disturbance in vision

Please return the completed answer sheet to the Federation Secretariat on or before 28 February 2006 for documentation. 1 CME point will be awarded for answering the MCHK CME programme (for non-specialists) self-assessment questions.

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Answers to January 2006 issue

Update on the Management of Pulmonary and Extrapulmonary Tuberculosis

FMSHK 40th Anniversary Activities

To celebrate the FMSHK’s 40th birthday, a series of special events and functions had been held year round in 2005 and also through 2006.

Federation President Cup Soccer Five Tournament 2005 - Semi-final and final
Date: 4 February, 2006
Venue: Whole Arena, Shek Kip Mei Park Sports Centre, 290 Nam Cheong Street, Shek Kip Mei, Sham Shui Po, Kowloon

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