Diabetic Eye Disease

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What is diabetes?

• Disorder of carbohydrate metabolism
• Lack of effect or production of endogenous insulin
• Type 1 and Type 2
• Multiple organ involvement
Organs affected

- **Large blood vessel disease**
  - Heart
  - Nervous system
  - Peripheral vascular disease

- **Small blood vessel disease**
  - **Eyes**
  - Kidneys
  - Nervous system
Ocular surface: Tear film and Cornea

- Tear film - Dry eye
  - Reduced tear quantity
  - Reduced tear film stability
- Reduced corneal sensitivity
- Greater risk of viral* and fungal infections#

# Gopinathan et al., Cornea 2002; The epidemiological features and laboratory results of fungal keratitis: a 10-year review at a referral eye care center in South India.
Cornea

- Corneal nerve damage
- Keratopathy
  - Superficial punctate keratitis
  - Recurrent corneal erosions
  - Persistent epithelial defects
Iris, Pupil and Crystalline lens

- Miotic Pupil
- Iris neovascularisation
- Lenticular induced myopic shift!
- Cataract (post-subcapsular)
Retina

Diabetic retinopathy
Retina

- Two main retinal diseases in the older patient
  - Diabetic retinopathy
  - Age related macular degeneration

How to tell the difference?????
Retina

Diabetic retinopathy
- Accounts for >90% blindness under the age of 60

Age related macular degeneration
- Accounts for >90% blindness over the age of 60.
Key differential in retinal macular haemorrhages

- Principally, either diabetic maculopathy* or age related macular degeneration
- Less commonly branch retinal vein occlusion*
- Differentiate can be tricky:
  - Age ARMD > 60 yrs
  - Age DR <60yrs
  - Diabetic maculopathy* by itself is uncommon
    - Look for retinopathy beyond macula*
Clinical features

- Red bits (small and or large)
  - Blood: microaneurysms, haemorrhages

- White/yellow bits
  - Cotton wool spots, drusen & exudate

- Brown/black bits
  - Laser, pigment
Red Bits: small
Red bits: larger
Red Bits: Large

And Yellow bits
Red Bits: Large

And Yellow bits

Yellow bits = exudate
Red Bits: Large
And Yellow bits
And brown/black bits
More than one vessel involved
All the retinal signs accounted for!!

- Blocked vessels lead to
  - retinal haemorrhages
  - Cotton wool spots
  - Abnormal retinal vessels
    - Venous “sausaging”, irregularity
    - Intra-retinal microvascular anomalies
  - Disc new vessels
  - Retinal new vessels
All the retinal signs accounted for!!

- Leaking vessels lead to
  - Protein (hard exudate)
  - Haemorrhage
  - Fluid (diffuse and local)
    - Intra-retinal and Sub-retinal

*OCT scan showing fluid (oedema)
Diabetic retinopathy (DR)

- How we classify it.

- Background: bits and bobs but good vision.

- Pre-proliferative/ Proliferative: Ischaemic signs of varying degree leading to “new vessel growth”

- Maculopathy: involvement of the macula
Classification of retinopathy
vessel blockage

- No retinopathy
  - Background
    - Increasing Ischaemia
      - Proliferative
  - Non-proliferative
Classification of retinopathy
vessel leakage

No leakage

Leakage

Focal

Diffuse

Ischaemic
Non-proliferative Signs

- Microaneurysms
- Intraretinal haemorrhages
- Hard/Soft exudates
Venous changes
Proliferative retinopathy

- Neovascularisation
Intra-retinal microvascular abnormalities (IRMA)
Diabetic Macular oedema

Leakage of plasma through vascular abnormalities produces retinal oedema.
Classification of maculopathy
vessel leakage/blockage

Maculopathy

- Focal
  - Focal area of leak

- Diffuse
  - General leak

- Ischaemic
  - Loss of blood supply
Maculopathy

- **Focal** – Fluid, lipid and proteins leak from a focal group of microaneurysm often leaving a well defined yellow ring – ring or circinate exudate
- **Ischaemic** – Capillaries underlying the fovea are all occluded
- **Diffuse** – All the capillaries leak
Normal vasculature

Fluorescein angiogram
Ischaemic maculopathy
Screening Programs in NZ

- Wellington (Example)
- 13,000 diabetic in Wn
  - 400 patients screened
Social Engineering

- Healthy Living
  - Exercise
  - Weight loss
  - Support groups

Expensive, difficult to measure outcomes, politically unpopular
Why should we be interested?

- Increasing No’s 160,000 diabetics by 2026
  - MOH 2006. in Evidence based Best Practice Guide

- Personal cost
  - Morbidity, reduced life expectancy etc

- Economic cost
  - Lost opportunities, Tx $1,000 million for type 2 by 2021
    - Diabetes Inc 2001
Why are we interested?

- Retinopathy present in 1/3rd of diabetics
- 4-8% have retinopathy at diagnosis
- Leading cause of blindness in working age-group
- Prompt recognition and treatment of sight-threatening eye disease can prevent sight-loss
Treatment of retinopathy

- Historically no treatment
  - “diabetics died” before chronic complications developed
- Historically poor systemic treatment
  - Laser protocols for blockage e.g. pan retinal photocoagulation
  - Laser protocols for leakage e.g. focal laser
- Bevacizumab (Avastin)
  Help reducing macular oedema and neovascularisation
General management

• Education and support
• Institute good diabetic control
• Lifestyle changes
  – Weight loss
  – Dietary modification
  – Exercise
  – Cessation of smoking
• Carbohydrate control
  Diet
  Oral hypoglycemics
  Insulin
• Control BP & Lipids
• Monitor renal function
• Management of the complications of diabetes

Programmes “Get Checked”. Budget 2006 $76m for obesity. CM “Lets Beat Diabetes”
### Risk of retinopathy

- Age
- Duration of DM
- Glycaemic control
- Hypertension
- Lipid status
- Anaemia
- Pregnancy
- Obesity
- Smoking
- Alcohol use
- Other Systemic disease
- Ethnicity
Summary

• Blood and stuff in both retinae = diabetic retinopathy if pt < 60yrs

• If macula involvement = maculopathy

• If no macula involvement think “blockage”
Questions....