Diabetic Retinopathy Screening Program in the Cree Region of James Bay of Quebec

Nurse and Imager Training

Prepared and presented by:
David E. Lederer, MD FRCSC

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VIRTUAL HEALTH AND SOCIAL SERVICES CENTRE (CvSSS)

SIMPLIFYING TELEHEALTH!

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TOPICS

- Diabetes Refresher
- Ocular Anatomy
- Diabetic Retinopathy
- Other Ocular Diseases
- Diabetic Retinopathy Screening Procedures
- Diabetic Retinopathy Treatment
- Collective Prescription Procedures
- Hands-on Training

DIABETES MELLITUS - EPIDEMIOLOGY

- Every 2 seconds, 2 people are diagnosed with diabetes somewhere in the world
  - 135 million people worldwide
  - 300 million people projected by 2025
- Canadian Statistics
  - 1.8 million people in 2005 (5.5% of population)
  - 2.4 million people projected by 2016
DIABETES MELLITUS - EPIDEMIOLOGY

- Cree Nation
  - 2x more common
- Impact on Waskaganish (approximate)
  - 2,000 persons
  - 220 with diabetes (11%)

DIABETES MELLITUS

- Metabolic disorder characterized by the presence of hyperglycemia due to defective insulin secretion, defective insulin action or both
DIABETES MELLITUS

Definition based on fasting plasma glucose
- Fasting plasma glucose ≥ 7.0 mmol/L
- Casual plasma glucose ≥ 11.1 mmol/L + symptoms of diabetes
- 2 hr plasma glucose in a 75g oral glucose tolerance test ≥ 11.1 mmol/L
DIABETES MELLITUS

**TYPE 1**
- Result of pancreatic beta cell destruction
  - Autoimmune
  - Unknown etiology

**TYPE 2**
- Range of disease from insulin resistance with relative insulin deficiency to a predominant secretory defect with insulin resistance
DIABETES MELLITUS

- Leading cause of blindness in the working age population, end-stage renal failure and non-traumatic amputations
- Cardiovascular disease is 2-4x more common (leading cause of death)

ANATOMY
ANATOMY

The Retina

Macula

Optic Nerve Head

QUESTIONS?
DIABETIC RETINOPATHY

- Any Retinopathy: prevalence=40%
  - Proliferative retinopathy
    - Type 1: 23%
    - Type 2: 14% if on insulin; 3% if on oral Rx
  - Macular edema
    - Type 1: 11%
    - Type 2: 15% if on insulin; 4% if on oral Rx
DIABETIC RETINOPATHY

- Visual loss associated with
  - Falls
  - Hip fractures
  - 4-fold increase in mortality

HISTOPATHOLOGY

[Images of histopathological sections of diabetic retinopathy]
DIABETIC RETINOPATHY

- Defined as a clinical entity based on characteristic vascular and retinal changes
  - Microaneurysms
  - Intraretinal Hemorrhage
  - Exudates
  - Macular Edema
  - Vascular Malformation
  - Retinal Capillary Closure

  - Abnormal Vessel Growth (Neovascularization)

MICROANEURYSMS

[Image of microaneurysms in retina]
INTRARETINAL HEMORRHAGE

- Flame
- Dot-blot

EXUDATES

-
MACULAR EDEMA

- Normal Retina

VASCULAR MALFORMATION
RETINAL CAPILLARY CLOSURE

NEOVASCULARIZATION
NEOVASCULARIZATION

STAGES OF DIABETIC RETINOPATHY

- Nonproliferative
  - Mild
  - Moderate
  - Severe
- Proliferative
- Macular Edema
  - Present
  - Absent
- Clinically Significant Macular Edema
QUESTIONS?

OTHER DISEASES FOR WHICH WE CAN SCREEN

- Age Related Macular Degeneration
- Cataract
- Glaucoma
AGE RELATED MACULAR DEGENERATION

- More common in Caucasian race
- Onset age 55
  - One of the most common causes of visual loss after age 55
- Subtypes
  - Atrophic or Dry
    - 90%
  - Exudative or Wet
    - 10%
CATARACT

- Progressive opacification of the natural lens
  - Many causes including age, systemic disease and medications

CATARACT

- Diagram of the eye showing the retina, cornea, lens, pupil, iris, and optic nerve.
GLAUCOMA

- Optic neuropathy with characteristic optic nerve head and visual field changes
  - Many risk factors but one of the major risk factors is INTRAOCULAR PRESSURE (IOP)

PRIMARY OPEN ANGLE GLAUCOMA (POAG)

- Chronic disease that effects progressively causes loss of vision
  - Loss commences peripherally and moves centrally eventually causing blindness if left untreated
QUESTIONS?

DR SCREENING

**TYPE 1**
- 5 years after diagnosis in all persons ≥ 15 years
- After 20 years **99%** have DR (any grade)

**TYPE 2**
- All individuals at diagnosis
- After 20 years **60%** have DR (any grade)
SCREENING MODALITIES

- Direct ophthalmoscopy
- Indirect ophthalmoscopy
- Color fundus photography
  - 7 standard fields
- Pupil dilation

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COLOR FUNDUS PHOTOGRAPHY

- With or without pupil dilation
- 7 fields vs <7 fields
WHY DILATION

COLOR FUNDUS PHOTOGRAPHY

- With or without pupil dilation
- 7 fields vs <7 fields
WIDEFIELD VIEW OF RETINA

INTERNAL FIXATION
"CHEAT SHEET": EITHER EYE

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QUESTIONS?
INTERVALS FOR FOLLOW-UP
(American Academy of Ophthalmology)

- Normal → Yearly
- Mild → 9-12 Months
- Moderate → 6 Months
- Severe → 4 Months
- Macular Edema → 2-4 Months
- Proliferative → 2-3 Months
- Pregnancy → Pre-/Early Conception and every 3 months thereafter

TREATMENT

- Healthy lifestyle
- Medical control
  - Glucose
  - Blood Pressure
  - Cholesterol
- Laser treatment
- Adjunctive medications (for the eye)
HEALTHY LIFESTYLE

- Smoking cessation
- Weight loss
- Nutrition
- Exercise

GLUCOSE

No Baseline Retinopathy

- Intensive glucose control
  - 27% reduction in developing DR
  - 76% reduction in progression
**BLOOD PRESSURE**

- **Tight glucose control + Blood pressure <150/85 mmHg** resulted in **34% decrease** in retinopathy progression
  - Special consideration for use of ACE-inhibitors

**CHOLESTEROL**

- High cholesterol may be associated with increased macular exudates
  - It is unclear if decreasing cholesterol will decrease exudates and improve visual prognosis
    - **BUT IT CAN’T HURT**
LASER TREATMENT

- Grid/Focal Laser
- Panretinal Photocoagulation (PRP)

GRID/FOCAL LASER
GRID/FOCAL LASER

Clinically Significant Macular Edema

Before | After

PANRETINAL PHOTOCOAGULATION

PDR

Before | After
VITREORETINAL SURGERY

ADJUNCTIVE MEDICATIONS (FOR THE EYE)

- Steroids
  - Subtenon
  - Intravitreal
- Anti-VEGF medications
  - Avastin
  - Others
- Rapidly growing area of research
QUESTIONS?

BREAK
THE SCREENING PROCESS

- Check visual acuity with glasses
- Check intraocular pressure
- Dilate the eyes
- Photography

HOW TO CHECK VISION
QUESTIONS?

HOW TO CHECK IOP
HOW TO CHECK IOP

Technical Aspects
- Administer 1 drop Alcaine 0.5% to both eyes
- **TAP** Tonopen on center of cornea 10 times in rapid succession in either eye
  - Listen for the beeps to tell you the number has registered
  - Record the results
- Repeat for other eye
  - **Be careful not to push on the eye**
QUESTIONS?
RISKS

- Corneal Abrasion
  - Blurred vision
  - Painful (but self limited)
    - Pain relieved with Alcaine 0.5% drops
  - May give any antibiotic ointment/cream 4x per day for 4 days
  - If pain worsens or vision does not improve call the doctor

IF A PATIENT RETURNS WITH A “COMPLICATION”, ALWAYS RE-CHECK IOP IN BOTH EYES

HOW TO DILATE THE PUPILS

- Administer 1 drop Alcaine 0.5% to both eyes (if not already done)
- Administer 1 drop Mydriacyl 1% to both eyes
  - Wait 5 minutes and repeat administration of Mydriacyl
- Wait 20 more minutes
  - Record pupil size using provided card
  - Proceed to photography
HOW TO MEASURE PUPIL SIZE

- Intolerance To Drops
  - Mildly blurred vision
  - Itchy, irritated but not very painful
    - Variable relief with Alcaine 0.5% drops
  - May give any artificial tear drop 4x per day for 4 days
  - If pain worsens or vision does not improve call the doctor

IF A PATIENT RETURNS WITH A “COMPLICATION”, ALWAYS RE-CHECK IOP IN BOTH EYES
ACUTE ANGLE CLOSURE (AAC)

- Obstruction of the trabecular meshwork by the iris
  - Pupillary Block: Aqueous fluid is impeded from passing between the lens and iris in its travel from the posterior to anterior chamber
    - This incites a pressure gradient leading to iris bowing and obstruction of the trabecular meshwork

TERMINOLOGY

- Congenital glaucoma
- Primary open angle glaucoma
- Secondary open angle glaucoma
- Primary angle closure glaucoma
- Secondary angle closure glaucoma
- Acute angle closure
GLAUCOMA

- Optic neuropathy with characteristic optic nerve head and visual field changes
  - Many risk factors but one of the major risk factors is INTRAOCULAR PRESSURE (IOP)

NORMAL AQUEOUS FLOW
**IRIS-TRABECULAR MEMBRANE OBSTRUCTION & PUPILLARY BLOCK**

**RISK FACTORS**

- Shallow anterior chamber
  - Risks for a shallow anterior chamber
    - Hyperopia
    - Large cataracts
- Elevated intraocular pressure
- Fellow eye
DIAGNOSIS OF AAC

- Intraocular pressure > 40
- OR
- 2x the initial measurement PLUS
  1 major or 2 minor symptoms

- MAJOR SYMPTOMS
  - Severe eye pain not relieved by Alcaine drops
  - Sudden vision loss

- MINOR SYMPTOMS
  - Sudden headache
  - Decrease in vision
  - Nausea and vomiting
  - Eye ache
  - Corneal haziness
  - Eye redness
SYMPTOMS

- Corneal haziness
- Eye redness

TREATMENT

- Check pressure of both eyes
- Call the physician if criteria of AAC are met
- Proceed to treatment
- Verify allergies (caution SULFA)
  - Diamox 500mg PO x 1
  - Glycerin 30ml PO with juice x 1
  - Pilocarpine 2% 1 drop both eyes
    - REPEAT after 30 minutes and AGAIN 30 minutes later

May repeat the above procedure in 8 hours if the patient has not seen the ophthalmologist
DEFINITIVE TREATMENT

- Laser or surgery to create a secondary opening in the iris to bypass the pupillary block and thus alleviate the pressure gradient
CONCLUSION
The RUIS McGill Telehealth Expertise and Coordination Centre (CECoT) is the physical entity of the CvSSS that coordinates your requests.

CECoT contact information

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