Update on the Screening and Management of Diabetic Retinopathy

Lauren Patty Daskivich, MD, MSHS
Director, Ophthalmology and Eye Health Programs
Los Angeles County Department of Health Services
Assistant Professor of Clinical Ophthalmology
University of Southern California

Presenter Disclosures
The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:
No Relationships to Disclose

Educational Objectives
- Pathophysiology and visual/ocular sequelae of Diabetic Retinopathy (DR)
- Screening and follow-up guidelines for patients with Diabetes/DR
- Current and emerging treatments for DR

Epidemiology of Diabetes
- Prevalence of diabetes in US
  - 25.8 million children and adults (8.3% of the population)
  - 79 million children and adults are pre-diabetic
- Prevalence of diabetes World-wide
  - 285 million (2010) expected to rise to 439 million (2030)

Epidemiology of Diabetic Retinopathy
- Blindness
  - leading cause of new cases of blindness among adults aged 20–74 years.
  - In 2005-2008
    - 4.2 million with DR
    - 0.7 million (4.4% of diabetics) with advanced DR, many with severe vision loss.
- The Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR)
  - After 20 years
    - Type 1: 99% with DR
      - 3.6% were legally blind
    - Type 2: 60% with DR
      - 1.6% were legally blind

Ocular Anatomy and Diagnostic Testing
Ultrasound

Normal Ultrasound

Vitreous Hemorrhage

Tractional Retinal Detachment

Pathophysiology of Diabetic Retinopathy

Healthy Retina  Diabetic Retinopathy
**Symptoms of Diabetic Retinopathy**

- Blurred vision
- Floaters
- Fluctuating vision
- Distorted vision (metamorphopsia)
- Visual field defects
- Poor night vision
- Impaired color vision
- Total loss of vision

**Causes of Vision Loss in DR**

- Fibrous Proliferation (Angiogenesis)
- Vitreous Hemorrhage
- Capillary Occlusion (Ischemia)
- VEGF Production
- Neovascular Glaucoma
- Tractional membranes & Retinal detachments
- Macular Ischemia
- Retinal Edema

**Diabetic Retinopathy: A Spectrum of Disease**

**Epiretinal Membrane**

**Tractional Retinal Detachment**

**Screening and Management of Diabetic Retinopathy**
Diabetic Eye Disease

Key Points

- Treatments exist but work best before vision is lost

RECOMMENDED EYE EXAMINATION SCHEDULE

<table>
<thead>
<tr>
<th>Diabetes Type</th>
<th>Recommended Time of First Examination</th>
<th>Recommended Follow-up*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>3-5 years after diagnosis</td>
<td>Yearly</td>
</tr>
<tr>
<td>Type 2</td>
<td>At time of diagnosis</td>
<td>Yearly</td>
</tr>
<tr>
<td>Prior to pregnancy (type 1 or type 2)</td>
<td>Prior to conception or early in the first trimester</td>
<td>No retinopathy to mild moderate NPDR every 3 months. Severe NPDR or worse every 1-3 months.</td>
</tr>
</tbody>
</table>

*Abnormal findings may dictate more frequent follow-up examinations

No Diabetic Retinopathy

- Management:
  - Tight blood sugar (A1C < 7.0) and blood pressure control (< 130/80)

Follow-up: 1 year

Mild Non-Proliferative Diabetic Retinopathy

- Clinical findings:
  - Microaneurysms only

- Management:
  - Tight blood sugar and blood pressure control

Follow-up: 12 months

MILD NON-PROLIFERATIVE DIABETIC RETINOPATHY (NPDR)

- Microaneurysms

MODERATE NPDR

- Hard exudates
  - Microaneurysm
Moderate Non-Proliferative Diabetic Retinopathy

- Clinical findings:
  - Microaneurysms, dot-blot hemorrhages, exudates

- Management:
  - Tight blood sugar and blood pressure control
  - Treat macular edema if present

- Follow-up: 6-8 months

Severe Non-Proliferative Diabetic Retinopathy

- Clinical findings:
  - 4 quadrants of intraretinal hemorrhage
  - 2 quadrants of venous beading
  - 1 quadrant of IRMA

- Management:
  - Tight blood sugar and blood pressure control
  - Treat macular edema if present

- Follow-up: 3 months

Non-Proliferative Diabetic Retinopathy

<table>
<thead>
<tr>
<th>Stage of DR</th>
<th>Management</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>BG/BP control</td>
<td>Yearly</td>
</tr>
<tr>
<td>Mild</td>
<td>BG/BP control</td>
<td>12 months</td>
</tr>
<tr>
<td>Moderate</td>
<td>BG/BP control, Treat Macular Edema (if present)</td>
<td>6 months</td>
</tr>
<tr>
<td>Severe</td>
<td>BG/BP control, Treat Macular Edema (if present)</td>
<td>3 months</td>
</tr>
</tbody>
</table>

Treatment of Macular Edema

Diabetic Macular Edema
Management of Macular Edema: Focal Macular Laser

- Early Treatment Diabetic Retinopathy Study (ETDRS)
- Focal Macular Laser reduced the risk of moderate vision loss by 50%

Management of Macular Edema: Anti-VEGF Agents

VEGF
- Production up-regulated in states of ischemia and inflammation/wound-healing
- Stimulates Angiogenesis
- Increases Vascular Permeability

Anti-VEGF Agents

Ocular Safety:
- 0.02% risk of endophthalmitis
- 1-2% risk of ocular inflammation
- No association with glaucoma progression
- No retinal toxicity

Management of Proliferative Diabetic Retinopathy
**Clinical findings:**
- Neovascularization
- Pre-retinal Hemorrhage
- Vitreous Hemorrhage

**Management:**
- Tight blood sugar and blood pressure control
- Panretinal Photocoagulation
- Vitrectomy for Vitreous Hemorrhage
- Treat macular edema if present

**Follow-up:** 1-2 months

**Diabetic Macular Edema Prevalence**

- Mild non-proliferative DR: 3
- Moderate to severe non-proliferative DR: 38
- Proliferative DR: 71

**Management of PDR: Panretinal Photocoagulation**

- Diabetic Retinopathy Study (DRS)
- PRP reduced the risk of severe vision loss by 50%

**Management of PDR: Vitrectomy**
Diabetic retinopathy is a leading cause of blindness among working-age adults.

Vision loss from diabetic retinopathy may be due to macular edema, macular ischemia, vitreous hemorrhage and tractional retinal detachment.

Tight blood pressure and blood sugar control are essential to slow progression of diabetic retinopathy.

Treatment options for DR include laser photocoagulation, intravitreal pharmaceutical agents and vitreoretinal surgery.

Diabetes is a multi-system disease and communication between physicians (and patients!) is critical.

Questions?