Age Related Macular Degeneration (AMD)

Background
1. Definition:
   o Breakdown of light-sensitive cells of the macula leading to progressive loss of central vision, sparing of peripheral vision
2. Leading cause of vision loss & legal blindness in adults over 60 y/o
3. Patients rarely complain of symptoms until disease (Dz) advanced
4. Dz responds to early detection/prevention

Pathophysiology
1. Theories
   o Build-up of waste products (environmental & dietary)
   o Family hx
   o Breakdown of retinal circulation
   o HTN, smoking
2. Two forms
   o Wet AMD (exudative)
     • 10% of initial presentations
     • 80% of legal blindness or severe visual loss
     • Abnormal blood vessel growth with fluid leakage behind macula
     • Rapid vision loss – months to years
   o Dry AMD (Atrophic)
     • 90% of pts at onset
     • 13%-18% progress to Wet AMD at three years
     • Slow breakdown of macular cells – will see drusen deposits & chorioretinal atrophy
3. Prevalence: Dz affects 25-30 million people worldwide
4. Incidence rate in US – based on study involving 4000 people followed over 15 years - incidence of early and late AMD was 14.3 and 3.1 percent respectively.\(^1\)
   o Incidence expected to triple by 2025 secondary to aging Baby Boomers
5. Risk factors
   o >50 y/o, family hx, fair skin, blue eyes, farsighted vision, h/o: smoking, Htn, diabetes, CVD, exposure to UV light, obesity, cataract surgery, diet
6. Depression common secondary to vision loss

Diagnostics
1. History
   o Normal changes as eye ages
     • Difficulty adjusting to changes in light
     • Changes in color perception
     • Loss of contrast
     • Floaters
     • Dry, burning, or sandy feeling in eyes
   o Phantom visions (Charles Bonnet Syndrome)
Symptoms of possible AMD:
- Inability to find personal article in familiar environment
- Difficulty recognizing faces
- Print appears faded, colors washed out
- Water spots in center of pages
- Difficulty distinguishing colors
- Spilling reaching across table
- Problems with depth perception

Wet AMD: early symptom → distortion of straight lines, i.e. poles, appear wavy
Dry AMD: early symptom → gradual blurring of central vision

Physical exam
- Dx made primarily by symptoms
- Full ophthalmologic exam indicated if suspected
  - Neovascularization
  - Drusen: lipid and calcium deposits under retina
    - Small numbers normal as eye ages
    - Large amount associated with AMD

Differential Diagnosis
- R/o other causes of vision loss: diabetic retinopathy, chronic Htn, CVD

Therapeutics
1. Diet & nutritional supplements
   - Antioxidants
     - No more effective than placebo in prevention of age-related macular degeneration
   - Antioxidants in combination with zinc
     - Modest benefit in reducing progression to advanced macular degeneration

2. Treatment for Wet AMD
   - Laser surgery
     - Only effective in small percentage of pts
     - Greater risk than benefit
   - Photodynamic therapy
     - Verteporfin injected IV; activated by retinal illumination
     - Slows progression of dz, does not restore vision
   - Referral to low vision specialist to maintain lifestyle despite vision loss
   - Glucocorticoids – uncontrolled trials – shows benefits, requires randomized trials
   - VEGF (Vascular endothelial growth factor) Inhibitors
     - Ranibizumab – for those with acute and later lesions of fovea and no preserved vision in second eye. Also for large or well defined extrafoveal lesions (Grade 1B)
     - Bevacizumab – same as ranibizumab (antibody fragment of bevacizumab with modification) (Grade 1B)
Pegaptanib – more side effects than benefits as compared to ranibizumab and bevacizumab\textsuperscript{4,5}

**Prevention**
1. Early detection & prevention critical due to poor prognosis of advanced disease
2. Prevention/delay
   - Diet high in Lutein rich foods (dark-green leafy veg, yellow/red peppers, squash, pumpkin, kale)
   - Annual eye exams after 55 y/o
   - No clear evidence to benefits of prevention; however, in wet AMD, supplementation with vit D, E, zinc, copper, beta-carotene delays progression\textsuperscript{6,7}
   - Smokers should be supplemented with only zinc, as beta-carotene linked to increase risk of lung cancer and coronary disease\textsuperscript{8}
   - Decrease omega-6 fatty acids (vegetable oils), incr. omega 3 (cold-water fish...sardines, herring, salmon and tuna)
   - Eliminate trans. fats (burgers, fries, high cooking heat)
   - Regular exercise
   - Maintain normal BP and normal lipids for age and comorbidities
   - Sunglasses to block UV (need to say UV blocking)
   - Avoid tobacco, in any form, but smoking worst

**Prognosis**
1. Prognosis worsens with degree of disease
2. Can lead to complete vision loss
3. Early detection via careful hx critical to implement treatment and prevent progression

**Evidence-Based Inquiry**
1. What is the role of antioxidants in age-related macular degeneration?
2. What is the role of antioxidants in macular degeneration?

**References**


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