Eye Emergencies
You Don’t Want To Miss

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Eye Emergencies You Don’t Want to Miss

Learning Objectives

- Describe the clinical features of age-related macular degeneration and diabetic retinopathy so you will be able to identify your patients at risk and refer them for appropriate management.
- Identify at least 2 eye emergencies that can cause rapid blindness and potentially threaten life.

Faculty

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Bobby S. Korn, MD, PhD is an assistant professor of ophthalmology in the Shiley Eye Center at the University of California, San Diego School of Medicine (UCSD). Dr Korn completed his undergraduate degree at the Massachusetts Institute of Technology. He then attended the medical scientist-training (MD/PhD) program at the University of Texas, Southwestern Medical School. There, he studied the molecular mechanisms of cholesterol regulation in the laboratory of two Nobel Laureates. He completed his ophthalmology residency at UCSD serving as the chief resident and completed fellowship training in ophthalmic plastic, orbital and reconstructive surgery at UCSD.

Dr Korn is board certified by the American Board of Ophthalmology. He has a wide range of clinical interests including comprehensive ophthalmic care, craniofacial disorders, reconstructive surgery of the eyelid and face, management of thyroid eye disease, eyelid and orbital tumors and pediatric and adult disorders of the lacrimal outflow system. In addition, Dr Korn is a member of the UCSD Thyroid Eye Center.

In addition to his busy clinical practice, Dr Korn is an active teacher on the local, national and international level. He coordinates a prestigious international fellowship program at UCSD designed to train the future leaders in ophthalmology as they return to their home country. At the local and national level, he actively lectures to ophthalmologists and primary care physicians. He was the recipient of the Outstanding Research Award and Best Teaching Awards from medical students, residents, and fellows.

Dr Korn is also an active researcher and has published numerous peer-reviewed articles and textbook chapters. His research focuses on orbital stem cells and thyroid-related eye disease.

In his free time, he is a volunteer surgeon locally and internationally. He participates in humanitarian medical missions in Thailand, Mexico, and the Philippines.

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Dr Korn has nothing to disclose.

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**Drug List**

**Generic**
- acyclovir
- vitamin A, C, and E; zinc, copper
- verteporfin
- pegaptanib sodium
- ranibizumab
- bevacizumab

**Trade**
- Zovirax
- I-Caps, OcuVite PreserVision
- Visudyne
- Macugen
- Lucentis
- Avastin

**Suggested Reading List**

**Ophthalmology for Primary Care**


**The Red Eye and Ocular Trauma**


**Macular Degeneration and Vitamin Supplementation**


**Diabetic Retinopathy and Ocular Neovascularization**


**Retinal Artery Occlusions**


**Leucocoria and Retinoblastoma**


**Neuro-ophthalmic Emergencies**


**Glaucoma**

**Orbital Cellulitis**

**Temporal (Giant Cell Arteritis)**


**Retinal Detachment**


**Ocular Herpes Zoster**

Test one eye at time – Wear your reading glasses or bifocals if necessary to see the grid.

Hold grid 12-14 inches from you nose.

With the other eye covered, stare at the central dot in the grid.

Note any areas of missing, blurred, or distorted lines and any areas of black spots. Outline these areas with a pencil.

Use the first self-examination as your baseline for each eye and give them to your physician.

Repeat this self-examination at the recommended interval and call your physician immediately if you note any significant changes from your baseline.
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Making the Correct Diagnosis in the Primary Care

• Some eye diseases can cause permanent blindness
• Some eye diseases can threaten life

Eye Emergencies in Primary Care
Lecture Goals

• Eye Emergencies
  – Vision Threatening
  – Life Threatening
• Examination & Diagnostic Pearls
• Clinical Updates
  – Age Related Macular Degeneration
  – Diabetic Retinopathy
• 12 Interactive Clinical Case Scenarios

Eye Exam Checklist

• Visual Acuity
• Pupils
• Ocular Motility
• Confrontational Visual Fields
• External Exam
  • Lids, Conjunctiva, Cornea, Anterior Chamber, Iris, Lens
  • Direct Ophthalmoscope

Measuring Visual Acuity

• Test each eye separately with best correction (glasses or contact lens)
• 20/15, 20/20, 20/30, 20/40 ....
• 20/100
• 20/200
• 20/400
• Counting fingers at 1 ft, 2 ft ...
• Hand motion detection at 1 ft, 2 ft ...
• Light perception only
• No light perception

Clinical Case 1
Retinal Artery Occlusions

- **Occlusion of retinal artery by thrombosis or embolism**
- **Symptoms**
  - Painless vision loss
  - Transient (Amaurosis fugax)
  - Emboli from heart or carotid arteries
- **Complete thrombosis**
- **Signs**
  - Pale retina with cherry red spot in macula
  - Narrow arterioles with Hollenhorst plaques
  - Afferent Pupillary Defect (APD)
- **Irreversible retinal damage 90-120 minutes after onset of symptoms if complete thrombosis occurs**

Retinal Artery Occlusions

**Take Home Pearls**

- **Dislodge the retinal clot**
  - Ocular massage
  - IV acetazolamide or oral glycerol
- **STAT Sedimentation Rate to rule out temporal (giant cell) arteritis**
- **STAT ophthalmology consult**
  - Anterior chamber paracentesis
- **Systemic workup**
  - Embolic workup (carotid arteries, heart)
  - Atherosclerotic workup (lipid profile, coronary artery health)
  - PT, PTT, CBC
  - Patients < 50 yr ➔ ANA, RF, anti-phospholipid antibodies
- **Intra-arterial thrombolysis benefit unknown - limited clinical studies**


Orbital Cellulitis

**Recall key signs**

- Decreased vision
- Proptosis
- Reduced ocular motility
- Afferent pupillary defect (Marcus Gunn Pupil)

**Take Home Pearls**

- Recognize deep tissue, orbital apex involvement (Orbital Cellulitis)
  - Proptosis
  - Reduced ocular motility
  - Decreased vision
  - Afferent pupillary defect (Marcus Gunn Pupil)
- **Prompt Hospital Admission for Orbital Cellulitis**
  - Imaging of Cavernous Sinus and Orbit
  - Rule out infection
  - Rule out diabetic ketoacidosis (adults)
  - Rule out mucormycosis (adults)
  - ENT Consultation
- **Aggressive Management and Follow-up for Preseptal Cellulitis in Pediatric Patients**

Clinical Case 2

**Preseptal / Orbital Cellulitis**


Herpes Zoster Ophthalmicus

- **Hutchinson's Sign**
  - Skin lesions involving the nasal tip = increased risk of HZV ocular involvement

- **Acute Retinal Necrosis**
  - Retinal necrosis caused by virus leading to retinal hemorrhages and retinal detachment
  - Increased risk if HIV Positive²
  - Key Symptoms
    - Floaters
    - Flashes of Light
    - Shadows
    - Hutchinson's Sign
    - DECREASED VISUAL ACUITY

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Herpes Zoster Ophthalmicus

**Take Home Pearls**

- Refer to eye care provider if
  - Hutchinson’s sign (nasal involvement)
  - Conjunctival injection
  - Corneal staining
  - Light sensitivity
  - New onset floaters, flashes of light or shadows worse with eye movement
  - Sudden vision loss or decreased acuity
  - HIV positive
  - Eye lubrication
    - Preservative free artificial tears
    - Systemic anti-viral therapy (acyclovir)
    - Prevent secondary bacterial infection of skin lesions
  - Rule out HIV or immunocompromised condition if age < 40

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Clinical Case 4

**Leukocoria (White Pupil)**

**Differential Diagnosis**

- **Retinoblastoma** - Medical Emergency
- **Congenital Cataract** – Urgent if unilateral cataract because of amblyopia risk
- **Retinal Detachment**
- **Retinopathy of Prematurity**
- **Coat’s Disease**
- **Persistent Hyperplastic Primary Vitreous (PHPV)**
- **Ocular Toxoplasmosis**
- **Ocular Toxocariasis**

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**Retinoblastoma**

**Take Home Pearls**

- **Early Recognition**
  - Abnormal white pupil reflex (leukocoria)
  - New onset strabismus
  - Red eye with hypopyon
- Head CT Scan – intraocular calcifications
- Pediatric ophthalmology and oncology consults

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Clinical Case 5
Scleritis

- Recognize symptoms
  - Boring eye pain
  - Eye painful to touch
  - Eye pain on movement
  - Scleral injection
- Refer to rheumatology and ophthalmology
  - Systemic immunosuppression required to prevent scleral ulceration / perforation and life threatening vasculitis in majority of cases

Refer to rheumatology and ophthalmology

Diagnostic Test for Scleritis

Phenylephrine Challenge

- Apply one drop of 2.5% phenylephrine and re-examine eye in 15 minutes
- Eye remains red in scleritis
- Eye turns white in all other conditions (conjunctivitis)

Avoid use in
- Uncontrolled hypertension
- Narrow angle glaucoma
- Children under general anesthesia


Iris Neovascularization

- Presence of iris vessels indicates underlying systemic or eye disease
- Differential Diagnosis
  - Diabetes Mellitus
  - Carotid Artery Occlusive Disease
  - Retinal Vein Occlusions
  - Head or Nasal Radiation Therapy
  - Intraocular Tumors (rare)

Iris Neovascularization

Take Home Pearls

- Examine each iris
- Examine the optic nerves for neovascularization
- Control any underlying diabetes
- Rule out carotid artery occlusive disease
- Prompt referral to ophthalmology for laser treatment to prevent angle closure-glaucoma

Optic Nerve Swelling
Differential Diagnosis

- Increased Intracranial Pressure (Papilledema)
  - Tumor
  - Pseudotumor Cerebri
  - Subarachnoid Hemorrhage
  - Subdural or Epidural Hematomas
- Malignant Hypertension
- Optic Neuritis
- Meningitis
- Encephalitis
- Arteriovenous Malformations
- Intracranial Venous Sinus Thrombosis
- Optic Nerve Tumors
- Ischemic Optic Neuropathy
- Infiltration of the Optic Nerve (Tumors, Infection, Inflammation)
- Pseudopapilledema (Optic Nerve Drusen)

Examining the Optic Nerve
Take Home Pearls

- Always examine both optic nerves for any
  - visual disturbances
  - headaches
  - neck pain
  - eye pain or ocular discomfort
  - diminished visual acuity
  - abnormal pupils
- Direct Ophthalmoscope Pearls
  - Dark exam room
  - Start dial at zero, use your best distance
    vision (glasses, contacts)
  - Pharmacological pupil dilation if necessary
    (2.5% neosynephrine)

National Age-Specific Prevalence Rates for Glaucoma

- Is the nerve swollen?
  - Optic Disc Edema (Normal Intracranial Pressure)
  - Optic Neuritis
  - Anterior ischemic Optic Neuropathy
    - Papilledema (Increased Intracranial Pressure)
- What is the color of the optic nerve?
  - Pink (normal)
  - Pallor (suspect neurological disease)
- What is the size of optic cup?
  - Large size (suspect glaucoma)

National Age-Specific Prevalence Rates for Age-Related Macular Degeneration (AMD)
Age-Related Macular Degeneration (AMD)

**Etiology:** Unknown

**Risk Factors**
- Aging
- Hypertension
- Obesity
- Atherosclerosis
- Elevated plasma fibrinogen
- Cigarette smoking
- Poor diet


Dry AMD

- Affects 90% of all AMD patients
- Slow progression
- Small yellow-white deposits called drusen accumulate beneath the retina
- Risk of Progression to Wet AMD
  - More drusen lesions
  - Larger drusen lesions
  - Presence of retinal pigmentaion (metabolism waste products)
  - UK Moorfield Eye Hospital Study
    - Bilateral Dry AMD patients
      - 8.9% incidence after 1st year of diagnosis
      - 16% incidence after 2nd year
      - 24% incidence after 3rd year


Wet AMD

- Most severe form of AMD
- Occurs in 10% of all AMD patients
- Abnormal blood vessels beneath the retina cause bleeding, scarring, and retinal photoreceptor damage in macula
- Sudden, rapid loss of central vision

1 - Park SS. Resident and Staff Physician 2005; 51(7): 13-18.

Destructive Wet AMD Treatments

- Direct Laser Treatment
- Photodynamic Laser Therapy (PDT) - verteporfin

Anti-VEGF Wet AMD Treatments

- pegaptanib – modified oligonucleotide that binds to VEGF (2004)
- ranibizumab – recombinant monoclonal antibody that binds to VEGF (2006)
Ranibizumab 0.5 mg (n=240)  
Sham Placebo (n=238)

Adapted from Rosenfeld PJ et al.  N Engl J Med. 2006 Oct 5;355(14)

22 letter difference (95% CI 18.1, 24.2), P<0.01

Average one line acuity GAIN
Average 2-3 line acuity LOSS

* Minimally classic or occult lesions

MARINA Study Group:
Ranibizumab Monthly Injections
for Advanced Neovascular (Wet) AMD*

Ranibizumab 0.5 mg (n=139)  
PDT (Laser Treatment) (n=143)

ANCHOR Study Group:
Ranibizumab Monthly Injections vs PDT Laser Treatment
for Neovascular (Wet) AMD*

Average two line acuity GAIN
Average two line acuity LOSS

21 letter difference (95% CI 17.5, 24.6), P<0.01

Adapted from Brown DM et al.  N Engl J Med. 2006 Oct 5;355(14)

* Classic well defined lesions

Summary of Current Age-Related Macular Degeneration (AMD) Treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Method of Medication Delivery</th>
<th>Induced Macular Damage</th>
<th>Vision Delays</th>
<th>VISION IMPROVES</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Laser Treatment</td>
<td>none</td>
<td>yes</td>
<td>+</td>
<td>NO</td>
<td>0</td>
</tr>
<tr>
<td>Photodynamic Laser Treatment (PDT – verteporfin)</td>
<td>IV injections</td>
<td>Selective Damage</td>
<td>+</td>
<td>NO</td>
<td>3</td>
</tr>
<tr>
<td>Pegaptanib</td>
<td>Eye injections</td>
<td>none</td>
<td>+</td>
<td>NO</td>
<td>3</td>
</tr>
<tr>
<td>Ranibizumab</td>
<td>Eye injections</td>
<td>none</td>
<td>+</td>
<td>NO</td>
<td>4</td>
</tr>
<tr>
<td>Bevacizumab*</td>
<td>Eye injections</td>
<td>none</td>
<td>+</td>
<td>YES</td>
<td>4</td>
</tr>
</tbody>
</table>

* Off-label, FDA unapproved use

Age-Related Macular Degeneration
Take Home Pearls

• Refer all patients > 50 years for dilated eye exams of the retina
  • First degree relatives of AMD patients
  • Any yellow discoloration or lesions in the macula
• Stop smoking
• Sunlight and UV protection
• Diet rich in green, leafy vegetables and fish
• Daily Amsler grid self-monitoring
  • Any acute grid distortions ⇒ Immediate referral to ophthalmology

Amsler Grid

• ideal for self-monitoring of wet AMD
• sensitive for self-detection of early macular (central retina) disease
• Test each eye separately
• any new distortion noted implies macular disease and requires referral

AREDS Daily Vitamin Formulation for Wet AMD Prevention*

• Vitamin A 15 mg (573% RDA)
• Vitamin C 500 mg (753% RDA)
• Vitamin E 400 IU (1333% RDA)
• Zinc 80 mg (464% RDA)
• Copper 2 mg (60% RDA)

* Intermediate risk AMD in both eyes or advanced AMD in one eye only
**Macular Degeneration AREDS Vitamins**  
**Take Home Pearls**

- Consider AREDS Vitamins in all patients with macular degeneration
- Watch out for High Dose Vitamin A
  - Increased Lung Cancer Risk
  - Alteration of Serum Lipids – decreased efficacy with oral statin therapy
  - Caroteinemia – skin discoloration
- Always inquire about the patient’s vitamin therapy and history

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**Retinal Detachments**

**Take Home Pearls**

- Incidence 1 in 8000  
- Risk Factors
  - Prior retinal detachment in other eye
  - History of complicated cataract surgery
  - Extreme myopia (near-sightedness)
  - Prior eye trauma
  - Family history of retinal detachment

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**Clinical Case 9**

**Retinal Detachments**
Clinical Case 10

Temporal (Giant Cell) Arteritis

- Vasculitis of medium sized blood vessels
- Medical Emergency
  - Cerebral and cardiac vasculitis
  - Ophthalmic Emergency
  - Ischemic optic neuropathy
  - Retinal artery occlusions
  - Ischemia to cranial nerves (palsies)

- Symptoms
  - Age > 50 years
  - Headache, fatigue, scalp tenderness, jaw claudication, malaise, unexplained fever, amaurosis fugax (transient vision loss)

- Diagnosis
  - Elevated CRP
  - Elevated Sedimentation Rate (ESR)
  - Male Normal ESR = age divided by 2
  - Female Normal ESR = (10 + age) divided by 2
  - Temporal Artery Biopsy

Temporal (Giant Cell) Arteritis Take Home Pearls

- Always suspect in any elderly patient with new onset headache plus
  - Transient vision loss
  - Sudden vision loss
  - Sudden double vision (diplopia)

- Obtain STAT Sedimentation Rate

- Initiate systemic steroids early
  - Prevent vision loss in other normal eye
  - Prevent systemic vasculitis (cerebral, cardiac)

- Do not wait for the temporal artery biopsy result – initiate steroids promptly if suspicious

Diabetic Retinopathy

Manifestations

- Proliferative Neovascular Disease
  - Neovascular Glaucoma (Iris)
  - Vitreous Hemorrhage
  - Tractional Retinal Detachments

- Diabetic Macular Edema
  - Central blindness from pericyte vessel damage and leakage into the fovea photoreceptors

Diabetic Retinopathy Take Home Pearls

- Optimize systemic diabetes management
- Timely dilated eye examinations at recommended intervals
- Good communication with eye care provider
- Use your ophthalmoscope
  - Iris Neovascularization
  - Optic Nerve Neovascularization

National Age-Specific Prevalence Rates for Diabetic Retinopathy

Diabetic Retinopathy

- Optimize systemic diabetes management
- Timely dilated eye examinations at recommended intervals
- Good communication with eye care provider
- Use your ophthalmoscope
  - Iris Neovascularization
  - Optic Nerve Neovascularization
Clinical Case 12

Acute Third Nerve Palsy

- Potential Life Threatening Emergency
- Symptoms
  - Ptosis (Droopy Eyelid)
  - Diplopia when eyelid lifted (Double Vision)
- Signs
  - Eye down and out
  - Affected eye only able to abduct (look away from nose)


Third Nerve Palsy
Examine the Pupils

- Normal Pupil
  - Vascular Disease
    - Diabetes
    - Hypertension
    - Atherosclerosis
- Dilated Pupil
  - Brain Aneurysm
  - Brain Tumor

Third Nerve Palsy
Take Home Pearls

- Early recognition
- Inspect pupils carefully
- Prompt neurology and neurosurgery consultations
- Ancillary testing
  - Brain imaging (MRI / MRA)¹
  - Cerebral angiogram
  - Risk of stroke in ischemic patients²


Summary of Guidelines for Prompt Consultation / Referral

- Any sudden, unexplained vision loss
- Flashes of light, shadows, curtains with eye or head movement
- Sudden ptosis, double vision, abnormal pupil
- New headache, transient or permanent vision loss in older patients
- Abnormal pupils
  - Afferent Pupillary Defect
  - Asymmetrical Size
  - Non reactive pupil
- Abnormal blood vessels
  - Iris
  - Optic Nerve
- Abnormal optic nerves
- Central vision distortion or central vision loss
  - Amsler Grid Distortion

ARS – 15 (Survey)

How confident do you think you are now at accurately diagnosing eye disease?
1 – LEAST CONFIDENT
2
3
4
5 – MOST CONFIDENT