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  - Alcon Laboratories
  - Allergan
  - Carl Zeiss Meditec

Caring for Pregnant Patients in an Optometric Setting

Physiologic Changes

- Cornea
  - Increased thickness
  - Increased curvature
  - Intolerance to contact lenses
  - Krukenberg Spindles

Physiologic Changes

- Intraocular pressure
  - Decrease throughout pregnancy
  - No decrease in aqueous production
  - Result of
    - Increased trabecular outflow
    - Increased uveoscleral outflow
    - Decreased episcleral venous pressure
    - \( P = \text{production/outflow + EVP} \)
Physiologic Changes

- Visual Function Changes
  - Visual Field Defects
    - Bitemporal
    - Asymptomatic
    - Resolve post-partum
  - MUST TAKE ALL VISUAL FIELD COMPLAINTS SERIOUSLY AND WORK UP
  - Accommodation
    - Transient loss during pregnancy and lactation
  - Night vision problems
    - Developed countries
    - Developing countries

- Visual Function Changes
  - Accommodation
    - Transient loss during pregnancy and lactation

Physiologic Changes

- Misc.
  - Chloasma “mask of pregnancy

Refractive Error Changes in Pregnancy

“Because a change in corneal thickness changes the refractive index of the cornea to a small extent, one should wait until several weeks postpartum before prescribing a new correction.”

Refractive Error Changes in Pregnancy

“Anecdotal reports of changes in vision during pregnancy frequently are heard during residency training for obstetric as well as ophthalmology. However, a review of the literature in the area failed to reveal any studies that have systematically looked at this issue.”

Refractive Error Changes in Pregnancy

“Because stable refractions have been documented for most women during pregnancy, pregnancy is not a contraindication to prescribing corrective lenses.”

Refractive Error Changes in Pregnancy

- Duke-Elder
  - No mention of refractive change
- Hilton
  - Noted no change in refraction during pregnancy
- Wang
  - No refractive changes in pregnancy
- Manges
  - No changes between non-pregnant and pregnant women
- Pizzarello
  - Changes rare (12/240 women)
    - tended to be myopic shifts, with return to pre-pregnancy RE following delivery
  - Most common complaint: difficulty with night vision

Refractive Error Changes in Pregnancy
Refractive Surgery

- Pregnancy generally considered a contraindication to any elective procedure
- Sharif
  - 9 women who became pregnant within 12 months of PRK
    - 6 patients had myopic regression
- Hefetz
  - 8 patients with PRK
  - 6 stable refractive error (2 with myopic regression)
- Padmanabhan et al (Cornea 2010; 29(5): 569-72)
  - “Pregnancy-triggered iatrogenic (post-laser in situ keratomileusis) corneal ectasia – a case report”

Central Serous Chorioretinopathy

- Diagnosis
  - Remember CSC as a possibility
  - Consider non-invasive diagnostics
- Management

Pathologic Changes

- Central Serous Chorioretinopathy (CSC)
  - Increased risk throughout pregnancy
  - More likely to have subretinal fibrin deposition (“lemon drop”)
  - Resolution toward end of pregnancy or post-partum
  - Can reoccur in subsequent pregnancy

Pathologic Changes

- Hypertensive Disorders in Pregnancy
  - PIH: HTN in pregnant woman who was previously normotensive
  - Contains pre-eclampsia and eclampsia
  - Visual disturbances in 20-25% of pre-eclampsia & 30-50% of eclampsia patients
  - Visual disturbance may signal impending seizure
  - Immediate obstetric referral indicated with retinal or choroidal vascular abnormalities (other than diabetes)

Pathologic Changes

- Severe Vision loss in pregnancy
  - Serous exudative retinal detachments in eclampsia (10%)
    - Resolution within 3 weeks post-partum
  - Cortical blindness in eclampsia (15%) – related to vasogenic edema
    - Duration 4 hours to 8 days
  - Others
Pre-existing Conditions

• Diabetic Retinopathy
  – Pregnancy is a MAJOR risk factor for progression of retinopathy
  – Tendency toward some regression toward the end of pregnancy (but watch for 1 year post-partum)
  – Factors associated with progression:
    • Duration of diabetes
    • Glycemic Control prior to pregnancy
    • Severity of retinopathy at conception
    • Coexisting hypertension

Axer Siegel. Ophthalmology 1996

• 65 Type 1 diabetic patients
  – No Retinopathy:
    • 26% developed MILD NPDR
      – 50% total regression
      – 30% partial regression
  – NPDR:
    • 55% had progression
    • 22.5% progressed to PDR

Diabetic Retinopathy

• Examination Recommendations:
  – No retinopathy:
    • DFE in first trimester
    • Later only as needed for vision complaints
  – Mild NPDR
    • DFE in first trimester
    • DFE in second trimester
    • Monthly DFE in third trimester

• Retinopathy worse than mild NPDR:
  – DFE first trimester
  – DFE every 4-6 weeks beginning in 2nd trimester
• Recommend laser photocoagulation for severe NPDR ??
• Careful follow up for one year post-partum
• Gestational diabetes

Ocular Inflammation

• Chronic or recurrent, non-infectious uveitis
  • Behcet disease
  • VKH
  • Idiopathic
    – Lower recurrence rate
    • Recurrence more common in 1st trimester
    • Recurrence common post-partum
• Infectious Uveitis (Toxoplasmosis):
  – Recurrence is common in pregnancy
Peripheral Retinal Disease

- Landau, et al
  - Studied 10 patients with peripheral lattice, asymptomatic retinal holes
  - All women had no changes in retina following vaginal delivery
  - Conclusion: retinal holes do not require a Cesarean delivery

Glaucoma and Pregnancy

- Normally the IOP decreases by 15% during pregnancy
- Historically little overlap in childbearing age and glaucoma age

Maria, 32 year old HF

- Referred to Medical Eye Service from Family Practice Service of UEI for glaucoma evaluation
- HPI:
  - Exam in FPS found IOP 28mmHgOU, large C/D
- POH:
  - Several years since last exam
  - Spectacle wearer
  - No surgery, trauma
  - Refractive amblyopia OS (20/80)

Maria, 32 yo HF

- PMH:
  - 22 weeks pregnant, no complications to date
  - Seeking regular prenatal care
  - History of 3 previous miscarriages in first/early second trimester
  - No other significant medical history
- FH: unknown
- Meds: prenatal vitamins, calcium
- ALL: NKDA

Exam Findings

- BCVA: 20/15 OD, 20/80 OS
- EOMS: Full OU
- CVF: FTFC OD, OS
- Pupils: 5mm OU, 4+ D/C OD, OS; (-)RAPD
- SLE: normal OU
- Ta: 27mmHg OD, 26 mmHg OS
- See ON and VF
Question:
- Are there any other tests you want to do?

Question:
- What is your diagnosis?
  A. Primary Open Angle Glaucoma
  B. Glaucoma Suspect
  C. Ocular Hypertension
  D. Other

Question:
- How do you wish to manage this patient?
  A. Begin medical therapy
  B. Laser trabeculoplasty
  C. Filtering surgery
  D. Close follow up
  E. Refer for second opinion

Question:
- Which (if any) medications are safe to use during pregnancy?
  A. Beta blockers
  B. Prostaglandin analogs/prostamides
  C. Alpha-adrenergic agonists
  D. Carbonic anhydrase inhibitors
  E. Pilocarpine
## Use of Pharmaceutical Agents in Pregnancy

“...extreme caution should be used in administering any sort of medication to a pregnant woman.”


“A recent review article suggested that most topical ophthalmic drugs pose little risk to the mother and developing fetus.”


## FDA Pregnancy Categories

### Category A
- Adequate and well-controlled studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters).

### Category B
- Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women.

### Category C
- Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.

### Category D
- There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.

### Category X
- Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in use of the drug in pregnant women clearly outweigh potential benefits.
### Ocular Hypotensives

**Beta Blockers**
- Category C
- One report of fetal cardiac bradycardia/arrhythmia
- Often given to control systemic HTN in pregnant women
- Timolol is approved by AAP during lactation

**Prostaglandin Analogs**
- Category C
- Stimulate uterine smooth muscle contractions
  - Some concern for pregnancy loss
  - Latanoprost & travoprost are ester prodrugs
  - Small case series show no harmful effects

### Question:

**How do you wish to manage this patient?**
- A. Begin medical therapy
- B. Laser trabeculoplasty
- C. Filtering surgery
- D. Close follow up
- E. Refer for second opinion

### Glaucoma in Pregnant Patient

<table>
<thead>
<tr>
<th>Stage of Disease</th>
<th>Suspect &amp; Risk</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Consider SLT</td>
<td>Nursing considerations</td>
</tr>
<tr>
<td>Moderate</td>
<td>Consider SLT</td>
<td>Alpha agonist, Nursing considerations</td>
</tr>
<tr>
<td>Severe</td>
<td>Consider SLT, Alpha agonist</td>
<td>Refer early, Nursing considerations</td>
</tr>
</tbody>
</table>

### Antibacterial Agents

- **Penicillins**
  - Generally considered safe for pregnancy and lactation
  - Augmentin, Dicloxacillin – Category C

- **Trimethoprim**
  - Category C

- **Aminoglycosides**
  - Category C

---

### What About Other Medications?
### Antibacterial Agents

- **Topical quinolones**  
  - Category C
- **Macrolides (erythromycins)**  
  - Erythromycin and Azithromycin considered safe during pregnancy (Category B)  
  - Clarithromycin (Biaxin) CONTRAINDICATED
- **Tetracyclines**  
  - CONTRAINDICATED in pregnancy

### Corticosteroids

- **Generally considered contraindicated (systemic)**  
  - May be necessary to prevent sequelae in uveitis  
  - Often administered systemically to pregnant women for fetal lung development  
  - Topicals typically category C

### Use of Medications in Pregnancy

- Weigh risk/benefit  
- Use safest drug possible  
- Use lowest dosage possible  
- Avoid all medications if possible during first trimester  
- For topical medication, use nasolacrimal occlusion to decrease systemic absorption

### Office Emergencies

- **Surveys of family medicine offices:**  
  - Most report at least 1 per year  
  - Higher number in practices that see children and elderly
**Emergency vs. Urgency**

- **Emergency**: Condition or event that will result in loss of life or significant morbidity (loss of limb, organ function, or vision) within 48 hours
- **Urgency**: Condition or event that may result in significant morbidity at a time greater than 48 hours or which may progress to an emergency

---

**“Good Samaritan” Statute**

- When an accidental emergency occurs in front of a medical practitioner, the Good Samaritan statute applies. Under these statutes, a provider has no liability for rendering the best care he/she is able to provide.
  - The emergency must not be iatrogenic or due to negligence.
  - The provider must not charge for the services rendered.

---

**Handling Emergencies in Your Office**

- Offices need a 3-pronged approach
  - Prevention
  - Preparation
  - Action
- **Prevention**:
  - Observe & correct dangerous situations (fall risks, etc)
  - Medical history/questionnaire
  - Physical exam
    - Observe patient: Agitated? Nervous?
    - Baseline vitals

---

**Handling Emergencies in Your Office - Preparation**

- Both you and your staff need to be trained in CPR and basic life support and emergency care
- Training should include CPR on adults, children, and infants as well as the use of automated external defibrillator (AED)
- All staff should be trained and the training should be CURRENT

---

**Handling Emergencies in Your Office - Preparation**

- Supplies that you should have in your office:
  - Pocket mask or bag/valve/mask
  - Automated External Defibrillator (AED) with pads (check expiration date!)
  - Supportive medications (EpiPen, glucose tabs, benadryl, aspirin)

---

**Handling Emergencies in Your Office - Preparation**

- You should NOT stock items that your are not capable of using correctly and/or medications that you are not capable of safely & confidently administering
- You should have a written protocol for emergencies and clearly designate who is responsible for what task
  - Staff training is essential
  - Emergency drills
Common Pitfalls in Emergency Situation

• Staff does not know where equipment is, has no access (locked cabinet)
• Equipment/medicine is expired
• Staff does not know who is responsible for what
  – Someone to activate EMS/greet EMS worker at door
  – Someone to assist doctor
  – Someone to handle other patients or situations during emergency

General Concepts in Emergency

• Leader (YOU) must take control of situation
• Leader (YOU) must remain calm (or act calmly)
• Use of “closed loop” communication
  – Leader: “Jane call 911”
  – Jane: “I’m calling 911”
• “Culture of safety” in communication
  – If staff/leader does not hear or understand the communication, he/she MUST be “safe” to say that
  – “Focus on what is right for the patient, not who is right”

Emergency duties of a four-member dental team.*

<table>
<thead>
<tr>
<th>TEAM MEMBER 1 - LEADER</th>
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<tbody>
<tr>
<td>Determines the situation, positions the patient and directs the other team members</td>
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<tr>
<td>Acts as the emergency medical technician (2-1)</td>
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Staff Training- the Basics

• Basic Concept: MOST IMPORTANT OBJECTIVE of nearly all medical emergencies is to prevent/correct insufficient oxygen supply to brain or heart
  – Goal is to manage the patient until he/she recovers or until help arrives
• Focus on P-A-B-C (D)
  – Position
  – Airway
  – Breathing
  – Circulation
  – (Definitive treatment/Drugs/Defibrillation)

Norms to Remember

• Typical respiration rate in adult: 12-15 breaths per minute
  – Bradypnea: may result in underoxygenation
  – Tachypnea:
    • Often a sign of anxiety
    • May lead to hyperventilation syndrome
• Pulse:
  – Tachycardia: >100 bpm
  – Bradycardia: <60 bpm
  – Need to note strength and rhythm of pulse
Potential Emergencies/Urgencies

- Syncope
- Hypoglycemia*
- Chest Pain / MI*
- Stroke*
- Seizure
- Anaphylaxis*

Syncope (Fainting)-

- Syncope = spontaneous loss of consciousness caused by insufficient blood flow to the brain
- Rapid recovery (seconds to minutes)
- Risk: Common cause of falls
  - 30% of elderly patients will report that they FELL but will not realize that the CAUSE of the fall was syncope

Syncope – Warning Symptoms

- Dizziness
- Anxiousness
- Nausea
- Weakness
- Sweating/ clammy skin
- “I don’t feel right”

Syncope – Causes

- Vasovagal (#1 cause)
  - Prodrome usually occurs
  - Most common cause in our office
- Orthostatic Hypotension
  - Positional
  - Exacerbated by meds
  - Very common in elderly
- Cardiac
  - Arrhythmia, MI, cardiac valve disease
- Neurologic
  - Stroke, tumor

Syncope – Treatment

- Best treatment = PREVENTION
  - Be alert to patient mood – try to avoid
  - Talk to patient before, during, after procedure (“verbal anesthesia”)
  - Protect patient from falls
  - DO NOT LEAVE PATIENT ALONE
- Recline chair
  - Trendelenberg
  - Prevent fall
- Cool washcloth to back of neck or forehead
- Do not let patient drive home until fully recovered
- Simple vasovagal syncope should respond to positional changes within approximately 60 seconds
  - If not, consider hypoglycemia or CVA
  - Normal BP – consider hypoglycemia
  - High BP (very high) – must consider CVA as most common cause
Hypoglycemia
• Low blood glucose – MEDICAL EMERGENCY
  – Glucose <63mg/dL (diabetic patient)
  – Glucose <54mg/dL (non-diabetic patient)
• Most often complication of diabetes therapy

Hypoglycemia - Management
• Treatment (conscious):
  – Easily absorbable sugar (juice, candy, fruit, peanut butter crackers) or glucose tablets
  – 15g glucose (4 lifesaver candies, or 4 oz. soda or juice), recheck glucose in 10 minutes
    • Repeat up to 3 times
  – CALL 911 IF:
    • Blood glucose not improving with 3 doses
    • Patient unable to take anything by mouth and glucagon is not available
• Treatment (unconscious): Activate EMS

Chest Pain / Myocardial Infarction
• Acute Coronary Syndrome
  – Angina Pectoris
  – Acute Myocardial Infarction (AMI)
• Both are forms of ischemic heart disease

Angina Pectoris
• Chest pain due to ischemia of heart muscle
  – Caused by existing coronary artery disease
• Three Types:
  – Stable angina: chest pain/discomfort precipitated by some activity with minimal symptoms at rest
    • Lasts 5-15 minutes
    • Relieved with rest or sublingual nitroglycerine
  – Unstable angina: worsening or changing
    • Occurs at rest
    • Severe or new onset
    • Occurs with a crescendo pattern
  – Microvascular angina

Symptom - Angina
• Pain can be severe or just discomfort –
  – Squeezing
  – Burning
  – Choking
  – Heaviness/pressure/tightness
• Pain may be in chest, back, neck, jaw, or shoulder
• May be accompanied by sweating, nausea
Acute Myocardial Infarction - AMI

- Ischemic necrosis of the myocardium
- 1.5 million MI with 500,000 deaths each year in US
- Symptoms:
  - Sudden pain (chest, arm, jaw, shoulder)
  - Pain lasts 30 minutes, not relieved with nitro
  - Nausea, sweating, shortness of breath common
  - About 20% of MI have no symptoms

Differentiating Angina from AMI

- Patient’s history:
  - No prior episodes of chest pain: Assume AMI
  - Quality of the pain:
    - Significant but not severe: More likely angina
    - Radiating pain: More likely AMI
  - **Keep in mind the “Silent MI”
- Blood pressure:
  - Elevated BP: likely angina (elevated bp due to pain)
  - Low BP: more likely AMI (damage to heart)

Angina - Treatment

- Do they use nitroglycerine? Do they have any with them? If so, use it!
- Make patient comfortable
- **CALL 911 unless absolutely sure it is stable angina**
- Administration of aspirin
- ***90% of cardiac deaths occur within 2 hours of chest pain onset!!!!

AMI Treatment

- Pre-hospital treatment of AMI involves
  - MONA: morphine, oxygen, nitroglycerine, aspirin
- **ACTIVATE EMS**

Cardiac Arrest

- The HEART HAS STOPPED!
- Brain is not being perfused – time is critical
- Patient is UNCONSCIOUS and NON-RESPONSIVE
- No normal breaths (occasional gasps)
- NO PULSE

Cardiac Arrest

- BE PREPARED!!!!
- Get help – office staff, anyone else who can help
- **ACTIVATE EMS (Call 911)**
- Begin CPR with AED
  - Airway
  - Breathing
  - Circulation
- Stay Current – you and staff!
Stroke

• Cerebral Vascular Accident (CVA) = aka “Brain Attack”
• Symptoms:
  – Sudden, severe headache
  – Blurred vision
  – Paralysis, weakness, loss of coordination
  – Difficulty swallowing
  – Incontinence

Seizure

• 70% etiology unknown
• 30% injuries, tumor, infection, toxin
• Convulsive seizures
• Non-convulsive

Anaphylaxis

• Severe, rapid, systemic (whole-body) IgE-mediated hypersensitivity reaction
• Requires exposure to antigen. After re-exposure, the symptoms develop very rapidly
• Common causes:
  – Drug allergies
  – Food allergies
  – Insect bites/stings
• Less common causes:
  – Physical factors (exercise), latex, topical meds, biologic agents (semen)

Stroke – Treatment

• Protect from harm/injury
• Loosen tight clothing
• Protect head
• DO NOT restrain
• DO NOT protect tongue/put anything in mouth
• Activate EMS if it lasts more than 5 minutes, or seizure in pregnant patient

Anaphylaxis – Symptoms

• Skin (80-90%): urticaria, erythema, pruritis, swelling of lips/tongue
• Respiratory (70%): Chest tightness, cough, SOB, nasal congestion
• GI (30-45%): N/V/D, abdominal cramps
• Cardiovascular (10-45%): tachycardia, hypotension (LOC)
• CNS (10-15%): “Sense of impending DOOM”, confusion, headache

STROKE is an Emergency
Every minute counts — know these signs of stroke

ACT F.A.S.T.!

FACE
ask the person to smile. Does one side of the face droop?

ARM
Ask the person to raise both arms. Does one arm drift downward?

SPEECH
Ask the person to repeat a simple sentence. Are the words slurred? Can he/she repeat the sentence correctly?

TIME
If the person shows any of these symptoms, TIME IS IMPORTANT. Call 911 or get to the hospital fast. Brain cells are dying.

Make the ambulance go to the nearest certified stroke center.
**Anaphylaxis – Differential Diagnosis**

- Vasovagal response
- Chest/MI
- Pulmonary embolism
- Panic attack
- Acute asthma

**Anaphylaxis - Diagnosis**

- Clinical Criteria:
  1. Involvement of skin/mucous membranes PLUS respiratory symptoms or low BP
  2. Two or more:
     - Skin/mucosa
     - Respiratory difficulties
     - Low BP
     - GI symptoms
  3. Low BP after exposure to known allergen

**Anaphylaxis: Treatment**

- CALL 911
- Calm/reassure patient
- EpiPen (Intramuscular injection into thigh)
- Antihistamine (Benadryl) if able to swallow
  - Administer CPR if needed (may be difficult to ventilate)
- Prevent shock:
  - Lie flat
  - Raise feet
  - Cover with blanket

**Anaphylaxis - Treatment**

- Benadryl probably should be given to all patients with urticaria / anaphylaxis if able to swallow medication
  - 1-2mg/kg (max 50mg)
- DO NOT:
  - Place pillow under head
  - Give anything by mouth if having trouble breathing

**Anaphylaxis – Long Term**

- Avoid allergens if possible
- Carry EpiPen
- Medic Alert bracelet

**Summary: In-Office Emergencies**

- PREVENTION
- PREPARATION
- ACTION
- Steps for Care:
  - ASSESS the patient
  - CALL 911 for life-threatening emergency
  - TREAT the patient using supportive therapy until the situation is resolved and/or until help arrives
Thank you for your attention.

Questions?
Email: DMarrelli@uh.edu