Drug Induced Glaucoma

Jorge L. Fernandez-Bahamonde, MD.
• Topical, peri-orbital, local or systemic medications that lead to increase IOP and subsequent glaucoma.
  – Corticosteroids.
  – Non-steroidal agents.
Corticosteroids.

- Most common cause is from topical administration.
  - Also seen, although less common via systemic route.
  - Peri-orbital.
  - Intraocular (those retina guys!).
    - Weeks-Months later, peak 3 months.
  - Local.
Corticosteroids: Epidemiology

• 5-6% healthy subjects will have increase IOP after 4-6 wks of topical dexamethasone (Becker 1953)
  – Window: 2 weeks-years.
  • Variable.
  • Often dose & frequency related.
Corticosteroids: Epidemiology

• Greater risk:
  – POAG.
    • Its close relatives.
  – Angle recession glaucoma.
  – Myopic patients.
  – Systemic disease.
    • DM, RA, Cushing syndrome.
Corticosteroids: Epidemiology

• Steroid preparations.
  – Greater risk with “strong” steroids.
    • Dexamethasone, prednisolone.
    • Betamethazone dipropionate.
      – Nasal or inhalant prep.
    • Prednisone.
    • Trimacinolone acetonide (depot).
      – Kenalog.
    • Cortisone, po IV.
Corticosteroids: Epidemiology

- Lesser risk with “weak” preps.
  - Rimexolone (Vexol).
  - Loteprednol.
    - Lotemax.
      » Alrex.
  - Fluoromethalalone (FML).
  - Medrysone (HMS)
Corticosteroids: Epidemiology: Route.

**Greater risk: Ocular.**
- Topical.
  - Drops.
  - Oint.
- Periorbital.
  - Sub-Tennons.
  - Retrobulbar.
- Intraocular.
  - Depot.

**Lesser risk: Extra-ocular.**
- Systemic.
  - Endogenous: Cushing’s syndrome.
- Local
  - Skin close to eyes.
  - Nasal.
- Additive effects when ocular & systemic routes are used.
Corticosteroids: Pathophysiology.

- Decrease outflow facility, at the TM:
  - Increase polymerized glycosaminoglycans.
    - Stabilization of the lysosomal membranes.
    - Reorganization of the cytoskeleton of TM cells.
  - Increase collagen, elastin & fibronectin at the extracellular matrix.
    - Sialoglycoproteins.
  - All that in a patient with “quiet eyes”
Corticosteroids: S/S

- **Symptoms.**
  - Intermittent blurred vision.
    - Severe elevation IOP.
    - Cataracts (PSC).
- **Signs. (IOP, PSC).**
  - Ptosis.
  - Mydriasis
  - Atrophy of eyelid skin.
  - Ocular infections, corneal ulcers, conj. necrosis.
Corticosteroids: Dif. Dx.

• DD:
  – Open angles:
    • POAG.
    • OHT.
    • NTG.
  – PACG.
  – Infantile Glaucoma.
• Final Diagnosis: History.
Corticosteroids: Rx

- Stop steroids or use
  - An alternative agent.
    - Less powerful steroid.
    - NSAIA.

- Medical Rx.
  - Inhibitors of inflow.
  - Use caution with PFG or miotics.

- Filtering surgery.
  - Later seen more often post IVK.
Non-steroidal origin: Possibilities.

Agents

Open Angle

Mydriasis/pigment dispersion

TM obstruction

Closed Angle

Mydriasis/Increased Pupillary block

Lens swelling.
Non-steroidal origin.
Main: anti-cholinergic effect.

- Largest single cause: Atropine like effect.
  - Anti-psychotropics.
    - Phenothiazines.
      - Trilafon, Prolixin.
  - Anti-depressants
    - Tricyclic.
      - Elavil, Tofranil.
    - Non-tricyclic.
      - Prozac, Bolvidin.
    - MAO inhibitors.
      - Nardil, Parnate.

Usually associated to angle closure glaucoma of clear pupillary block origin.
Anticholinergic effect
Non-steroidal origin: Anti-histamines.

- Atropine like effect (cont.)
  - Anti-histamines.
    - Anti-H1. Block histaminic action over capillary permeability and smooth muscle of vessels and bronchi.
      - Norgesic  →  Acute angle closure.
      - Phenergan  →  Idiopathic lens swelling.
    - Anti-H2. Block histaminic action over peripheral blood vessels and gastric secretion.
      - Cimetidine (Tagamet) & Ranitidine raise IOP in POAG.
Non-steroidal origin: Anti-cholinergic effect.

- Atropine like effect (cont.)
  - Anti-parkinsonian. Artane.
  - Sympathomimetic.
    - Ephedrine, Epinephrine, Phenylephrine, Hydroxyamphetamine.
  - Parasympatholitic.
    - Cyclogel, Mydriacil, Atropisol, Homoatropine, Scopalomine (Transderm-Scop)
Non-steroidal origin: Anti-cholinergic effect.

• Inhalation agents. Anti-cholinergic effect.
  – Sympathomimetics & Parasympatholytic.
    • Angle closure.
  – Salbutamol & Ipratropium (BA)
    • Anti-cholinergic effect of Ipratropium.
    • Increase aqueous production of Salbutamol.

• Anti-spasmyotic: Anti-cholinergic effect.
  – No attacks of angle closure documented.
  – Increase IOP in POAG.
    • Pro-Banthine, Bentyl.
Non-steroidal origin: Alternate path of other drugs.

- Mood altering drugs.
  - Sedatives, Stimulants.
    - Doubts with Diazepam, no definite cases of angle closure.
    - No cases of elevated IOP reported with Opiates, Barbiturates or Amphetamines.

- Methylxanthines.
  - From bronchodilators to coffee or chocolate.
  - Increase IOP in POAG.
    - Block Phosphodiesterase, increase c-AMP (reverse effect of timolol)
Non-steroidal origin: Lens swelling.

- Idiosyncratic lens swelling leading to secondary angle closure without mydriasis. (Acute swelling of CB with zonules relaxation?)
  - Sulfa agents.
    - Antibiotics.
    - Hydrochlorothiazide.
    - Acetazolamide, yes Diamox!
      - JRA + ASA + Diamox: Secondary angle closure.
    - Topiramate (Topomax)
Non-steroidal origin:
Lens swelling, cont.

- Idiosyncratic lens swelling, (cont.)
  - Topomax (sulfa-related). Anti-convulsant.
    - Use epilepsy, bipolar disorder.
    - Ciliary body rotation
      - Bilateral secondary angle closure.
    - Sales 2001, $393 millions.
  - Others: ASA, Quinine, Tetracycline.
    - Watch ASA in RA + narrow angle or Diamox + JRA + ASA.
Non-steroidal origin: Those things at surgery.

- **Intra-op.**
  - **Viscoelastic. Best Rx. Remove it!**
    - Direct acute obstruction of TM.
      » Use pilopine gel, pilocar 2% or miostat.
      » 12-24 hrs.
  - **Gas.**
    - Secondary angle closure, reduce proportions.
      » Gonio pre-op, if doubt go ahead with LPI pre-PPV.
      » Rx: Beta-blockers, CAIs, Atropine, LPI, gas removal.
  - **Silicone oil.**
    - Pupillary block. (inferior PI advised).
    - Direct effect over TM (emulsify oil reach TM).
Silicon oil in A/C
Non-steroidal origin: Misc.

- Misc. agents.
  - Anesthetics. Increase EOM tone.
    - Succinylcholine, Ketamine, Chloral Hydrate.
  - Cardiac agents.
    - Anticholinergic effect.
      - Disopyramide phosphate (Norpac).
  - Botulin toxin.
    - Angle closure.
      - Pupillary mydriasis (effect on the ciliary ganglion).