Contents

1) GLAUCOMA

DDx corneal endoth. growth over t.m.
1) post. polymorphous corneal dystrophy
2) ICE syndromes
3) chronic intraocular inflam.
4) following blunt trauma
5) following penetrating injury
6) rubeosis

DDx of iris distortion
1) Axenfeld-Rieger's
2) ICE syndrome
3) PPD?
4) rubeosis
5) iris melanoma
6) post trauma

Target IOP
- an IOP that will presumably prevent future optic nerve damage
Factors:
1) severity of existing optic nerve damage
2) level of IOP at which nerve damage occurred
3) current height of the IOP
4) rapidity with which the damage occurred
5) age (younger - lower IOP)
6) race - blacks - lower IOP

Target IOP
1) mild damage: 15-20% reduction
2) moderate damage (field defects in both hemifields): 20-30% reduction

Causes of pigmented TM
1) pseudoex
2) pigm. dispersion syndrome
3) post hyphema
4) melanomalytic
5) aging
6) DM
7) race
8) chronic uveitis
9) iris color
10) post PI
11) post trauma
12) COAG ?

Causes of cupping
1) Chronic glaucoma
All the following have pallor:
2) AION (arteritic more common cause 60-80%)
3) syphilis
4) compressive lesion
5) hypotensive episode
6) Leber's hereditary optic neuropathy
7) trauma
8) myopic changes
9) coloboma
10) retinal or nerve causes

Risk factors for COAG
1) increased IOP
2) age
3) family hx.
4) D.M.
5) steroids
6) myopia
7) blacks>whites
8) CV disease

DDx of normal tension glaucoma
A) *intermittent elevated IOP*
1) Posner Schlossman
2) previous uveitic glaucoma
3) diurnal fluctuation COAG
4) hyposecretion COAG (burnt out)
5) intermittent ACG
6) previous steroid use
B) *Other*
1) previous hypotensive (BP) episodes
2) ON compression
3) methanol toxicity
4) syphilis
5) anemia
6) old AION

Mechanisms of tumors causing glaucoma
1) direct invasion angle
2) neovascularization of angle
3) hemorrhage (hyphema, ghost cells)
4) necrosis with t.m. blockage by tumor cells
5) displacement of lens-iris diaphragm

Blood in Schlemm's canal
A) *raised episcleral venous pressure*
1) retrobulbar tumors
2) TRO
3) SVC syndrome
4) orbital varices
5) C-C fistula

6) dural sinus fistula
7) Sturge Weber syndrome
8) familial
B) *pressure differences*
1) excessive pressure with Goldmann lens
2) ocular hypotony
3) diffuse episleritis

Risks for elevated IOP on steroids
1) COAG
2) family history of COAG
3) DM
4) myopia

VF defects
1) paracentral and nasal step - 50%
2) paracentral - 25%
3) nasal step - 25%
4) temporal wedge - 2% (myopes)

Causes of increased Goldman IOP
1) eyelid squeezing
2) breath holding
3) Valsalva
4) pressure on globe
5) tight collar
6) excessive fluoress
7) tono not calibrated

Decreased scleral rigidity (decreased Shiotz IOP)
1) high myopia
2) cholinesterase inhibitors (PI)
3) thyroid disease
4) post cataract surgery
5) scleral buckling
6) compressive gases
7) RD surgery
8) corneal edema?

Increased ocular rigidity
1) epinephrine or vasoconstrictors
2) chronic glaucoma
3) extreme myopia
4) hypermetropia

disc signs of glaucoma
A) *Generalized*
1) large cup
2) asymmetric cups
3) progressive enlargement of cup

B) *Focal*
1) rim notching
2) vertical elongation of cup
3) splinter heme
4) regional pallor
5) NFL loss

C) *Other*
1) exposed lamina cribosa
2) nasal displacement of vessels
3) baring of circumlinear vessels
4) peripapillary crescent

DDx of Iris Plateau
- situation: increased IOP despite PI
1) post. synechiae
2) imperforated PI
3) multiple iris cysts
4) aqueous misdirection
5) COAG with narrow angles
6) combined mechanism glaucoma
7) steroid or cycloplegic effect

Uveitis with glaucoma
A) *Autoimmune*
1) Posner Schlossman
2) Fuch's heterochromia
3) Trabecular precipitates
4) sarcoidosis
5) JRA
6) iritis (usually low IOP)
B) *Infectious*
1) HSV
2) HZV
3) syphilis
4) toxoplasmosis
C) *Other*
1) neovascular glaucoma

Causes of acute increase in IOP
1) ACG
2) Posner-Schlossman
3) inflammatory glaucoma (see above)
4) malignant glaucoma
5) postop glaucoma
6) suprachoroidal hemorrhage
7) retrobulbar hemorrhage

Signs of ACG
1) ciliary-conjunctival injection
2) corneal edema
3) cells in aqueous (but no keratic precipitates)
4) glaucomflecken
5) PAS
6) posterior synechias
7) engorged iris vessels
8) iris atrophy
9) optic atrophy
10) closed angle gonioscopically (narrow angle in fellow eye)

Uveal effusion syndrome
- due to increased scleral thickness or hydrostatic causes
A) *Thickened sclera*
1) nanophthalmos
2) scleritis
3) hyperopia
B) *Uveal inflammation*
1) VKH
2) SO
3) chronic uveitis
4) post cryo or laser
C) *Other*
1) idiopathic
2) ocular hypotension
3) post-op
4) C-C fistula

Conditions where dilators (not miotics) are indicated
1) aphakic / pseudophakic pupil block
2) malignant glaucoma
3) uveitic glaucoma
4) nanophthalmos (usually)
5) phacomorphic glaucoma
6) spherophakia (microspherophakia)

Conditions where miotics are indicated
1) COAG
2) pigment dispersion (1st drug)
3) pseudoexfoliation
4) acute ACG
5) plateau iris syndrome

Meds which don't lower IOP
1) Ketamine (about the same)
2) Succinylcholine (mild increase)

Angle anomaly in congenital glaucoma
1) anterior insertion
2) Barkan's membrane
3) no angle recession

Provocative Tests in ACG
1) *mydriatic*
- IOP increase of 8 mmHg is positive result
- perform gonioscopy to confirm angle-closure
2) *phenylephrine - pilocarpine*
- IOP increase of 8 mmHg is positive result
3) *Thymoxamine*
- will lower IOP only by decreasing pupil block
4) *dark room*
- patient in a dark room for 1 to 2 hr
- the patient is instructed to remain awake (to prevent sleep-induced miosis)
- a rise in IOP of 8 mm Hg is positive when angle-closure is verified by gonioscopy
- identifies only about 50% of true ACG
5) *prone test*
- patient lies face down for 60 min without sleeping
- IOP rise of 8 mm Hg is positive when angle-closure is verified by gonioscopy
- 50% detected
6) *prone dark room*
- prone and dark combined
- more sensitive

Angle Grading (from Shields Textbook)
Van Herick's angle
Grade 1) < ¼CT
Grade 2) = ¼CT
Grade 3) ¼½CT
Grade 4) > 1 CT

Scheie's classification (from Shields)
Wide open - all structures seen
I: hard to see over iris root; CB seen
II: SS seen
III: TM seen
IV: SL seen

Shaffer's Classification (from Shields)
A) Wide open (20-45%)
B) 10-20 degrees
C) < 10 degrees
D) closed

Spaeth Classification (from Shields)
1) angle of iris (10-40)
2) configuration (q, r, s)
3) insertion (A-E); A=SL; E=CB

VF definitions
A) *Humphrey*
1) 24-2: 54 points (incl 2 points for blind spot)
2) 30-2: 76 points
3) FP: buzzes when no stimulus
(>33% is significant)
4) FN: doesn't buzz when suprathreshols stimulus is presented (9 dB)
(>33% is significant)
5) FL: buzzes when stimulus is in blind spot
(> 20% is significant)
6) STF: fluctuation during duration of test; determined by rethresholding 10 points
7) LTF: fluxtuation between 2 different tests
8) MD: location-weighted *mean of the values in the total deviation* plot ("the average height of the entire hill of vision")
9) PSD: standard deviation from mean deviation for each point (always a positive number)
10) CPSD: CPSD = $(PSD^2 - STF^2)^{1/2}$; CPSD is PSD corrected for influence of STF
11) Total deviation plot: plot of deviation at each point relative to age-matched controls
12) Pattern deviation plot: plot of total deviation - mean deviation for each point
B) *Octopus*
1) STF: retests all 59 points

Vessels in Angle
A) *Normal*
1) radial iris vessels
2) circumferential c.b. vessels
3) anterior ciliary vessels
4 don't arborize
5) don't cross SS
B) *NV*
1) cross from c.b. → SS → t.m.
2) arborize over t.m.
3) "trunk-like vessels"
4) may have accompagnying fibrosis
C) *Fuch's*
1) fine
2) branching
3) unsheathed
4) meandering

Causes of NV glaucoma
1) DM
2) CRVO, BRVO
3) BRAO
4) RD
5) retinal tumor
6) uveal tumor
7) uveitis
8) ocular ischemic syndrome
9) trauma

Treatment of ICE syndrome
1) antiglaucoma meds
- may need lower IOP than usual for corneal edema
2) Muro-128 for corneal edema
3) ALT useless
4) do trab for either nerve damage or IOP causing corneal edema (Avi says not true)
5) PKP

Unilateral glaucoma
1) PHPV
2) ICE
3) Fuch's
4) Neovascular
5) Uveitic
6) Glaucomatocyclitic crisis

Treatment of Pigment Dispersion
1) pilo (
2) beta blocker
3) ALT
4) trabeculectomy

2) LENS

DDx of excresc. on internal lens surface
1) tridomy 21
2) Lowe's syndrome
3) aniridia

Ddx of retained cell nuclei
1) Rubella
2) Lowe's
3) Leigh's
4) Trisomy 13

Anterior lenticonus
1) Lowe's
2) Alport's (hereditary nephritis)

Posterior lenticonus
1) PHPV
2) idiopathic
3) Lowe's
4) Alport's

Anterior Polar cataract
1) aniridia
2) Lowe's
3) Alport's

ASCC causes
1) trauma
2) miotics
3) radiation (early)
4) naphthalene
5) chronic iritis
6) atopic dermatitis
7) post ACG
8) phenotiazines and amiodarone: pigment deposition but usually not visually significant
9) electric shock

PSCC causes
1) steroids
2) age
3) inflammation
4) trauma
5) radiation
6) atopic dermatitis

Medications which cause cataract
1) steroids
2) phenothiazines (ant. epith)
3) amidarione (star shape)
4) miotics (ASCC)

Specific cataracts
1) sunflower: Wilson's
2) christmas tree: myotonic dystrophy, oculopharyngeal dystrophy ?
3) snowflake: juvenile DM
4) oil droplet: galactosemia

Iridescent lens particles
1) meds
2) hypocalcemia
3) myotonic dystrophy
4) idiopathic - familial
5) DM

Opaque Cornea and Cataract
1) rubella
2) Peter's
3) Von-Hippels's internal ulcer
4) PHPV
5) Lowe's

Ddx ectopia lentis
A) *With systemic conditions*
1) Marfan's - chr.15 (fibrillin def.): up
2) homocysteinuria (glycoprotein of zonules): down
3) Weil-Marchesani: temporal
4) Ehlers Danlos (collagen)
5) Stickler's (collagen)
6) hyperlysinemia (collagen)
7) sulfite oxidase deficiency
8) tertiary syphilis

B) *with ocular conditions*
1) aniridia
2) microspherophakia
3) buphthalmos
4) megalocornea
5) high myopia
6) uveal coloboma
7) Peter's anomaly

C) *other*
1) trauma
2) simple ectopia lentis (AD) (fibrillin)
3) ectopia lentis et pupillae (AR)
4) familial (AD)

Workup for subluxated lens
A) *History*
1) family history: Marfan's (heart, SKM anomalies), homocysteinuria (MR), visual problems
2) patient history: trauma, MR, health
B) *Eye exam*
1) acuity
2) strabismus
3) ant. segment (aniridia, PHPV, trauma evidence)
4) retinoscopy (myopia)
5) U/S: axial length
6) family exam
C) *Labs*
1) cardiology consult
2) cardiac U/S
3) urine a.a. (homocystinuria)
4) hand x-ray (Marfan's)

Microspherophakia
A) *Associated with subluxated lens*
1) Weill-Marshsani
2) Marfan's
3) hyperlysinemia

B) *Associated with retained nuclei*
1) Lowe's
2) rubella

C) *Other*
1) Alport's
2) Peter's anomaly
3) Familial isolated

Work up for congenital cataracts
A) *Unilateral*
1) history - age of onset, family history
2) ocular exam: PHPV, lenticonus, RD, mass
3) Labs: TORCH Titer, VDRL (TORCHS)
B) *Bilateral*
1) History - family history, age of onset
2) development of child history
3) complete ocular exam
4) pediatrician and genetics consult
5) Labs: TORCH Titre, VDRL, urine reducing substances (galactosemia)
6) Optional: urine for a.a. (Lowe's), RBC galactokinase, calcium, phosphorus

Breakdown of Lens Proteins
1*) Water insoluble proteins* (intracellular) - 86%
a) alpha: 32% - largest (600-4000 kDa)
b) beta: 55% - medium size
c) gamma - smallest (20 kDa)
2) *water soluble proteins* - 14% (membrane)
a) MIP (main intrinsic polypeptide) - 50%

Lens protection from free radicals
1) glutathione peroxidase
2) superoxide dismutase
3) catalase
4) Vit E
5) Vit C

Stages of lens maturation
1) mature: cortex is white and liquid
2) Morgagnian: nucleus sinks to bottom
3) hypermature: lens proteins leak out and capsule wrinkles

Types of lens induced glaucoma
1) phacoantigenic
- follows trauma by 24 hours or more
- trauma may be surgical eg ECCE)
- zonular granulomatous inflammation
- see mutton fat KP's
- posterior synechia
- Treatment: steroids, cycloplegia, remove lens
2) phacolytic (microscopic)
- hypermature cataract leaks lens protein
- protein and macrophages block t.m.
- no KP's, no synechia
- Treatment: IOP reduction, remove lens
3) lens particle: (macroscopic)
- following penetrating injury or ECCE
- particulate debris clogs t.m.
- mild inflammation
- many feel this is a mild form of phacoanaphylactic
4) phacomorphic
- large lens
- occludes angle
NB unrelated: ghost cell (following VH)

3) UVEITIS

3 types of granul. infl.
1) diffuse: VKH
2) discrete: sarcoid
3) zonal: phacoantigenic uveitis, chalazion

Hypersensitivity
type I) IgE and antihistamine release (immediate)
- allergic conjunctivitis (allergy to drops)
- seasonal allergic (hay fever) conjunctivitis (allergy to airborn Ag's)
- atopic KC
- GPC
- vernal

type II) specific antibodies to basement mb.
- pemphigoid
- dermatitis herpetiformis
- pemphigus

type III) immune complex deposits
- Mooren's
- scleritis
- Wessely rings
- vasculitis
- giant cell arteritis
- Wegener's
- P.A.N.

type IV) delayed (T cell) hypersensitivity (1-3 days)
- sarcoidosis
- phlyctenulosis
- corneal graft rejection
- interstitial keratitis
- rosacea
- GVH
- drug allergy: contact blepharoconjunctivitis
- skin: contact sensitivity

type V) AB stimulating
- myasthenia
- Grave's

Ddx of Granulomatous intraocular inflammation
A) *Infectious*
1) TB
2) leprosy
3) syphilis
4) fungus
B) *Non-infectious*
1) sarcoid
2) VKH
3) sympathetic ophthalmia
4) RA

Heterochromia
A) *involved iris darker*
1) ocular or oculodermal melanocytosis
2) diffuse iris nevus
3) diffuse iris melanoma
4) Fuch's iridocyclitis (paradoxical)
5) siderosis (iron f.b.)
6) hemosiderosis
7) ICE syndrome
8) leukemia
9) lymphoma
10) extensive rubeosis

B) *involved iris lighter*
1) congenital Horner's - rarely acquired
2) Fuch's iridocyclitis
3) chronic uveitis
4) JXG
5) metastasic carcinoma
6) Waardenburg's syndrome
7) diffuse amelanotic nevus
8) retinoblastoma
9) albinoidism
10) Posner Schlossman

C) *Other (unsure)*
1) Sturge-Weber

Conditions with Dalen-Fuchs nodules
1) S.O. (sparing of c.c.)
2) VKH
3) sarcoid
4) TB

Involvement in sympathetic uveitis
1) choroid
2) not choriocapillaris
3) scleral canals (uveal tissue)
4) optic disc (uveal tissue contained)
- therefore, evisceration insufficient

Causes of acute iridocyclitis (fibrinous)
- fibrin net
- hypopion and/or hyphema rare but possible
- iris bombe

A) *HLA-B27 uveitis*
1) ankyl. spond.
2) psoriasis
3) Reiter's
4) IBD
B) *Granulomatous*
1) TB
2) sarcoid
C) *Other*
1) Behcet's
2) Lyme?
not: RA, strep, gout

Uveitis + Arthritis
A) *HLA- B27*
1) ankyl. spond.
2) psoriasis
3) Reiter's
4) IBD
B) *non-HLA-B27*
1) JRA
2) SLE
3) relapsing polychondritis
4) Behcet's

Causes of rubeosis
A) *Vascular*
1) diabetes
2) CRVO/BRVO
3) CRAO/ BRAO
4) ocular ischemic syndrome
5) anterior segment ischemia
6) other retinal vascular diseases
B) *Non-Vascular*
1) chronic uveitis
2) chronic RD
3) CACG - untreated
4) intraocular tumor (RB, melanoma)

Hyphema in adults
1) trauma
2) rubeosis (see above)
3) severe iritis (HSV, HZV)
4) coag. disorder (hemophilia)
5) post-op
6) leukemia
7) intraocular tumor (JXG, RB)

Hypopion in adults
1) corneal ulcer
2) endophthalmitis
3) retained lens debris
4) tumor necrosis (RB, melanoma)
5) tight contact lens
6) severe iritis
7) reaction to IOL

Iris atrophy
1) HZV
2) HSZ
3) post ACG
4) post-op
5) post trauma
6) Fuch's
7) pigment dispersion
8) pseudoexfoliation (pupil border)
9) DM

Congenital iris atrophy
1) aniridia
2) Axenfeld-Rieger's
3) Marfan's
4) ectopia lentis et pupillae
5) microcoria

Absent dilator muscles
1) rubella
2) Marfan's
3) Lowe's oculocerebral syndome
4) microcoria
5) ectopia lentis et pupillae

Stellate KP's
1) Fuch's
2) HSV
3) HZV
4) CMV
5) toxoplasmosis

Diffuse KP's
1) Fuch's heterochromic iridocyclitis
2) sarcoid
3) syphilis
4) HSV
5) HZV
6) toxoplasmosis
7) graft rejection

Conditions with intermediate uveitis
1) pars planitis

2) MS (5%)
3) Lyme disease
4) sarcoidosis
5) peripheral toxocara
6) Candida (masquerade)
7) Whipple's disease

DDx of vitreous opacities
1) pars planitis
2) sarcoidosis
3) Candida endophthalmitis
4) asteroid
5) synchisis scintillans
6) amyloidosis
7) Whipple's disease
8) tumor cells

Types of endophthalmitis
1) *Acute: < 2 weeks*
a) mild: Staph epi, sterile
b) severe: S aureus, strep, G -

2) *Chronic: > 2 weeks*
- P. acnes, S. epi, fungi

Prognosis:
- acute, mild and chronic: 80% are up 20/40 or better
- acute, severe: 20% are 20/40 or better

Ddx of *mild* endophthalmitis
1) < 6 weeks S.epi
2) 1-3 months: Candida
3) 3 months-2 years: P.acnes

Risks for Candida endophthalmitis
1) drug abuse
2) indwelling catheter
3) chronic disease
4) immunosuppressed: chemo, AIDS
5) TPN
6) systemic candidiasis
7) DM

Causes of endogenous endophthalmitis
A) *fungal* - see above
B) *bacterial*
1) bacteremia (eg. meningococcus, H Flu)
2) endocarditis (strep)
3) pyelonephritis (G -)
4) osteomyelitis
5) skin infections (Staph Aureus)
6) IV drug abuse (Bacillus - contaminated in water sources)

Acute Infectious Retinitis syndromes
1) PORN Syndrome
- peripheral retina
- *absence of vascular inflammation*
- *absent ocular inflammation*
- rapid progression
- no consistent spread pattern
- immunocompromised?

2) ARN Syndrome
- peripheral retina
- *occlusive vasculopathy*
- *prominent vitreous inflammation*
- rapid progression
- circumferential spread
- *healthy individuals*

3) CMV Retinitis
- anywhere in retina
- *vessel sheathing and hemorrhage*
- minimal inflammation
- *slow progression*
- enlargement of lesions
- immunocompromised

4) Acute Syphilitic retinitis
- secondary or tertiary syphilis

5) Toxoplasmosis in AIDS

3 types of toxocariasis
1) chronic endophthalmitis (2-9)
2) localized granuloma (6-14)
3) peripheral granuloma (6-40)

Five Findings in Histo
1) peripapillary atrophy
2) peripheral linear streaks
3) punched out lesions
4) SRNV
5) no vitritis

Follow Up for JRA
A) *disease begins at < 7 years of age*
1) ANA+: Q 3 months

2) ANA -: Q 6 months
B) *disease begins at > 7 years old*
1) every 6 months for all
C) *disease present for duration > 7 years*
1) Q yearly for all

Treatment of Pars Planitis
1) topical steroids if macular edema or vision decreased
2) Sub-Tenons steroids Q monthly only if bad
3) if getting worse: po steroids
4) if getting cataract: immunosuppresives (Cyclophosphamide?) - adults only

Sarcoidosis Workup
1) CXR
2) ACE
3) serum calcium
4) serum lysozyme
5) SPEP (elevated IgG)
6) anergy testing
7) biopsy of lid or conj. granuloma
8) biopsy of lacrimal gland if enlarged
9) gallium scanning
10) lung biopsy if diagnosis crucial
* Kveim test no longer done

Treatment of sarcoidosis
1) topical steroids
2) systemic steroid + H2 blocker
3) complications prn (NV, glaucoma)

Work up for VKH
1) FA
2) U/S
3) LP (CNS signs)

When not to treat a uveitis with steroids
1) Fuch's iridocyclitis
2) pars planitis without macular edema
3) toxoplasmosis without PM bundle or ON threatened or severe vitritis or ant. uveitis

When to use sub-Tenon's steroids
1) patient is not a steroid responder
2) uveitis not controlled with topical or oral steroids
3) NEVER use in Toxoplasmosis
4) used only for posterior or interm. uveitis

Uveitic Diseases always treated with immunotherapy
1-5 always (AAO uveitis p. 77)
1) Behcet's
2) necrotizing scleritis (RA)
3) VKH
4) serpiginous ??!
5) sympathetic ophthalmia

Uveitic Diseases that can be treated with Immunosuppressives
1) pars planitis (in adults only)
2) retinal vasculitis
3) resistant iridocyclitis

Special Tests in Uveitis
1) LP: VKH
2) ELISA: Lyme, Toxo
3) CT orbit: ARN (large nerve)

Steroids in toxo
A) *systemic*
- 60-80 pred po per day 24 hours after antibiotics are started then taper based on response
1) ON threatened if vitritis prominent
2) macula threatened if vitritis prominent
3) severe vitritis
B) *topical*
1) anterior uveitis

Antibiotics in Toxo
1) peripheral lesion: Clinda + Sulfa
2) juxtamacular lesion: add pyrimethmine + folinic acid

4) RETINA

A) MEDICAL RETINA

I) VASCULAR

Causes of cotton wool spots

A) *Vascular spasm*
1) diabetes
2) hypertension
3) SLE/CVD
4) AIDS
5) CRVO/BRVO
6) BRAO
7) radiation
8) cocaine
9) interferon
B) *Vessels obstruction*
1) anemia
2) leukemia
3) lymphoma
4) Purtcher's retinopathy (chest wall compress.)
5) fat embolism (long bone #)
6) acute pancreatitis
7) b.m. transplant retinopathy ? (debris?)
8) cardiac valve disease (emboli)

Roth's spots

- retinal heme with fibrin thrombus in center
A) *Anemias*
1) leukemia
2) pernicious anemia
B) *6 S's*
1) SBE
2) septicemia
3) shaken baby
4) SLE (& other CVD)
5) scurvy
6) sarcoid
C) *Other*
1) DM

Ddx of periarteritis

A) *Infectious*
1) toxoplasmosis
2) syphilis
B) *Immune*
1) PAN (arterial by definition)
2) Wegener's

Ddx of periphlebitis

A) *Infectious*
1) syphilis
2) TB
3) fungal retinitis
4) septicemia
5) HIV
6) HSV/HZV retinitis
B) *Inflammatory*
1) sarcoidosis
2) pars planitis
3) Behcet's
4) M.S.
5) polychondritis
C) *Other*
1) Eales'
2) sickle cell anemia
3) IV drug abuse

Ddx of perivasculitits (unsure)

A) *Infectious*
1) CMV
B) *Inflammatory*
1) polychondritis
C) *Other*
1) frosted branch angiitis
2) reticulum cell sarcoma

Other causes of sheathing

1) CRVO/BRVO
2) CRAO/BRAO

Frosted branch angiitis - described in 1976
1) bilateral idiopathic vasculitis
2) responds very well to systemic steroids
3) seen in CMV as well

Eales' disease - described in 1880
1) obliterative vasculitis
2) can develop NV
3) treat ischemic areas with laser to eliminate NV

DDx of retinal NV

A) *Posterior Pole*
1) CRVO/BRVO
2) DM
3) chronic inflammation
B) *Peripheral*
1) sickle cell disease: SC>SThal>SS>SA
2) IV drug abuse (talc)
3) ROP
4) sarcoid (seafans)
5) Eales' (idiopathic vasculitis)

6) leukemia
7) anemia
8) Norrie's?
9) FEVR?

DDx of retinal telangiectasias
A) *Ocular*
1) Coat's disease
2) Leber's miliary aneurysms (early Coat's)
3) perifoveal telangiectasias
4) BRVO
8) RP with Coat's-like response
B) *Systemic*
1) diabetes
2) radiation
3) ocular ischemic syndrome

Retinal vessel tortuosity in kids
A) *Ocular*
1) Eales' disease
2) Coats' disease
3) optociliary shunt vessels
4) peripapillary vascular loops
5) combined hamartoma
B) *Systemic*
1) ROP
2) respiratory insufficiency
3) Fabry's
4) sickle cell anemia
5) diabetes

DDx of retinal vessel tortuosity in adults
A) *Ocular*
1) BRVO
2) Eales' disease
3) Coats' disease
4) epiretinal mb
5) combined hamartoma
B) *Systemic*
1) ocular ischemic syndrome
2) diabetes
3) sickle cell anemia
4) Fabry's
5) radiation

DDx of ocular ischemic syndrome
1) C-C fistula
2) carotid artery obstruction
3) GCA

Risk factors for BRVO
1) male gender
2) hypertension
3) hyperopia
4) diabetes mellitus
5) COAG
6) BCP

Risk factors for CRVO
1) diabetes mellitus
2) hypertension
3) COAG
4) BCP
5) diuretics
6) hyperopia?

End points of retina studies:
1) DRS: severe visual loss (< =20/800)
2) ETDRS: moderate visual loss (doubling of visual angle)
3) DCCT: progression of retinopathy
4) MPS: severe visual loss (loss of 6 Snellen lines or quadrupling of visual angle)
5) BVOS: final VA>= 20/40 (60% vs. 34% in those treated with Argon grid after 3 months)
6) Cryo-ROP study: unfavorable outcome (RD, ?)

Ddx of macular SRNV
1) ARMD
2) POHS
3) myopia
4) laser burns
5) serpiginous
6) AMPEE
7) angioid streaks
8) post-choroidal rupture
9) tumors
10) idiopathic
11) o.n. drusen

DDx of peripapillary SRNV
1) ARMD
2) POHS
3) myopia
4) laser burns
5) serpiginous
6) angioid streaks
7) choroidal rupture
8) tumors

9) o.n. drusen
10) choroidal osteoma
11) combined hamartoma of the RPE
12) inferior atrophic tract in CSR

Signs of occult SRNV
1) macular heme
2) macular exudate
3) diffuse leakage on F/A
4) "notch sign" on F/A

Definitions:
- classic and occult refer to hyperfluor. patterns
1) *classic SRNV:*
- early: bright, uniform hyperfluorescence
- late: leakage
2) *occult SRNV:*
- early: stippled or not hyperfluorescent
- late: fluor. in area of elevated RPE or other area
A) *well defined SRNV:*
- boundary between SRNV and normal retina easily seen
B) *pooly defined SRNV:*
- boundary between SRNV and normal retina: not readily seen
I) *Persistant SRNV* - SRNV < 6 weeks of treatmnet on periphery of prior treatment scar
II) *Recurrent SRNV* - SRNV > 6 weeks after treatment and on periphery of scar

DR classification (ETDRS) for PRP
A) *Severe NPDR*
- 15% progress to high risk PDR in 1 year
Any one of: (actually compared to ETDRS photps)
1) diffuse heme and m/a in 4 quadrants
2) venous beading in 2 quadrants
3) IRMA in 1 quadrant
B) *Very severe NPDR*
- 45% progress to high risk PDR in 1 year
- any 2 of above

Causes of vitreous hemorrhage
1) All causes of NV
2) retinal tear
3) PVD
4) RD
5) retinoschisis
6) trauma
7) macroaneurysm

DDx of retinal vascular embolus
A) *platelet fibrin*
- dull gray; elongated
1) carotid
2) heart
B) *cholesterol*
- sparkling yellow; at bifurcation
1) carotid
C) *calcium*
- dull white; around disc
1) heart
D) *talc*
- yellow-white glistening particles
- macula arterioles
- may see NVE
E) *lipid or air*
- don't see embolus; see CWS
1) Purtcher's

Juxtafoveal Telangiectasia
1) unilateral parafoveal
- like Coat's
- more common in males
- responds to laser
2) Bilateral parafoveal
- get SRNV's
3) Bilateral perifoveal with capillary obliteration
- don't do well

II) MACULAR
Risk Factors for ARMD (Bloom)
1) drusen
2) light-skinned
3) cigarette smoker
4) hypertension
5) age
6) female
7) sun exposure
8) dietary factors
9) large, confluent, or soft drusen
10) hyperopia

Risk Factors for SRNV in ARMD (Bloom)
1) high cholesterol
2) cigarette smoker
3) large, confluent, or soft drusen
4) dietary factors
5) female
6) light-skinned

7) fellow eye has SRNV
8) hyperopia

Macular dragging
1) ROP
2) FEVR
3) Toxocara
4) Any cause of NV with tractional RD (SCA, DM, CRVO, BRVO, sarcoid, Eales')
5) PVR (RD, inflam., trauma)
6) epiretinal membrane
7) juvenile retinoschisis
8) pars planitis

Associations of angioid streaks
1) PXE
2) Paget's disease of bone
3) sickle cell anemia
4) Ehlers-Danlos
5) age
6) idiopathic (>50%)
7) diabetes
8) thalessemia
9) optic nerve drusen

DDx of CME
1) intraocular inflammation
2) post-op: "Irvine-Gass Syndrome"
3) retinal vascular anomalies
- VHL, CSR, Coat's?, JXF telang.?
4) diabetes (no disc leak seen)
5) tumors
6) RP (up to 70%)
7) adrenergic medications post-op
8) BRVO/CRVO

DDx of epiretinal membranes
1) idiopathic (> 50 y.o., 20% bilat.)
2) PVD (most common)
3) CRVO, BRVO
4) CRAO, BRAO?
5) uveitis
6) trauma
7) post-op (laser, cryo, and intraocular surg.)
8) retinal breaks

Signs of ERM
1) heme
2) CWS
3) edema
4) tortuous vessels

Causes of choroidal folds
1) idiopathic
2) hyperopia
3) orbital disease: tumor, TRO, OID
3) choroidal tumor
4) posterior scleritis
5) ocular hypotony
6) RD (hypotony)
7) scleral laceration (weak wall)
8) papilledema or papillitis (pushing sclera)
9) scleral buckle (pushing)
11) ARMD
12) Uveal effusion

DDx of bull's eye
A) *Ocular dystrophies, degenerations*
1) cone dystrophy (or rod dystrophy - rare)
2) Stargart's disease
3) pattern dystrophy (benign concentric annular dystophy - AD)
4) ARMD
5) Leber's congenital amaurosis (rare)
6) AUIM (acute unilateral idiopathic maculopathy)
B) *Medications*
1) chloroquine
2) hydroxychloroquine
(Plaquenil: max 400 mg/day or 300g total)
C) *Systemic diseases*
1) Bardet-Biedl
2) Batten's disease (ceroid lipofuscinosis)
3) Spielmayer-Vogt syndrome
4) storage diseases

Causes of toxic maculopathies
1) chloroquine: bull's eye
2) hydroxychloroquine:: bull's eye
3) quinine O.D.: retinal and O.N. ischemia
4) phenothiazines: chlorpromazine and thioridazine: pigment in macula and midperiphery
5) tamoxifen: diffuse yellow crystaline deposits
6) canxanthin: diffuse tiny yellow dots

DDx of cherry red spot
1) storage diseases (sphingolipidoses/gangliosidoses) - Gaucher's, Tay-Sachs, Niemann-Pick, Sandhoff's
2) CRAO
3) cilio-retinal artery occlusion

4) traumatic retinal edema (Purtcher's)
5) macular hole with surrounding RD
6) macular hemorrhage
7) SSPE (subacute sclerosing panencephalitis)
8) solar retinopathy

Adult vitelliform
1) later onset
2) smaller lesion
3) better prognosis
4) multifocal lesions
5) normal or near-normal EOG

Stages of macular holes (new - Gass 1995)
1A) foveolar detachment
1B) foveal detachment
2) early hole (<400 microns)
3) larger hole (>400 microns) +/- operculum
4) full thickness hole with PVD

Causes of macular holes
A) *Host causes*
1) idiopathic
2) PVD
4) inflammation with pseudohole
5) optic pit
6) myopia
B) *External Causes*
1) solar retinopathy (outer lamellar hole)
2) trauma
3) macular photocoagulation for DM

DDx macular star (exudates)
1) hypertension
2) diabetes
3) SRNV
4) LISN (Leber's idiopathic stellate neuroretinitis)
5) Coat's disease (Leber's miliary aneurysms)
6) near macroaneurysm
7) retinal capillary hemangioma
8) BRVO/CRVO
9) papilledema
10) radiation

DDx of macular atrophy
1) POHS
2) serpiginous
3) myopia
4) choroidal osteoma
5) ARMD
6) coloboma
7) toxoplasma
8) central areolar choroidal dystrophy (AD) - 17
9) Sorsby's macular dystrophy (AD) - chr. 22
10) North Carolina macular dystrophy (AD) - 6
11) pattern dystrophy (AD)
12) end stage Best's (AD) - chr. 11
13) AMPEE
14) post laser treatment (SRNV, telangiect.)
15) thioridazine toxicity

DDx of ARMD (AAO)
(macular RPE changes with drusen)
1) CSR
2) pattern dystrophy
3) basal laminar drusen
4) drug toxicity - eg. chloroquine

DDx of macular disciform scar (AAO)
1) macroaneurysm
2) pattern dystophy
3) basal laminar drusen
4) CSR
5) VKH
6) posterior scleritis

III) POSTERIOR UVEITIS
Ddx of white dot syndromes
A) *Autoimmune*
1) MEWDS
2) multifocal choroiditis
3) birdshot
4) PIC (punctate inner choroidopathy)
5) syphilis
6) acute RP epitheliitis (unilateral, macular)

DDx of acute chorioretinal plaques
A) *Infectious*
1) candida
2) miliary TB (CXR)
3) Nocardia abscesses (treatble and lethal; CXR)
4) miliary toxoplasmosis
5) pneumocystis (AIDS)
6) coccidio (AIDS)
B) *Autoimmune*
1) AMPPE
2) birdshot ?
3) mulitfocal choroiditis ?
C) *Other*

1) preeclampsia choroidopathy

DDx of acute macular hyperfluorecence
(acute RPE inflammation)
A) *Immune*
1) ARPE (acute RP epitheliitis "- Krill disease")
2) MEWDS
3) AMPPE
4) CSR
5) acute macular neuroretinopathy - rarely
B) *Infectious*
1) DUSN (diffuse subacute neuroretinitis)
2) rubella (aquired)
3) onchocerciasis
4) ophthalmomyasis

IV) OTHER
DDx of peripapillary atrophy
1) POHS
2) serpiginous
3) myopia
4) choroidal osteoma
5) COAG
6) angioid streaks
7) ARMD
8) coloboma
9) toxoplasma
10) "peripapillary choroidal atrophy" (AD)
11) combined hamartoma of the RPE
12) onchocerciasis
13) post sympathetic ophthalmia

DDx large yellow choroidal masses
A) *Solid - non-malignant*
1) ARMD
2) choroidal osteoma
3) choroidal cavernous hemangioma
4) parasitic infection (eg cystercicosis)
B) *Solid - malignant*
1) mets
2) retinoblastoma
3) amelanotic melanoma
4) leukemic infiltrate
5) lymphoma
C) *Fluid*
1) toxemia pf pregnancy
2) posterior scleritis
3) malignant HTN
4) VKH
5) sympathetic ophthalmia

Ddx of Pseudo RP (pigmentary retinopathy)
A) *Infectious*
1) rubella
2) syphilis
3) TB
4) DUSN
5) influenza
6) varicella
7) rubeola

B) *Medications*
1) thioridazine toxicity
2) chlorpromazine

C) *Metabolic disorder*
1) phytanic acid storage disorder (Refsum's)
2) abetalipoproteinemia
3) Vitamin A deficiency
4) mucopolysaccaridoses
5) cystinosis

D) *Syndromes*
1) Kearns-Sayer
2) Usher's syndrome (deafness)
3) Stickler's
4) Lawrence-Moon-Biedl
5) myotonic dystrophy
6) Friedrich's ataxia
7) Cockayne syndrome

E) *Post RD*
1) Harada's (VKH)
2) toxemia of pregnancy
3) post ROP
4) rhegmatogenous RD

F) *Vascular*
1) old CRVO
2) old CRAO
3) old BRVO

DDX of Mizuo's sign
(Normal fundus after 3-4 hours of dark adaptation)
1) Oguchi's disease (form of CSNB)
2) cone dystrophies
3) female carriers of X-linked RP
4) juvenile retinoschisis

Lipofuschin deposits
1) Best's
2) pattern distrophies
3) Stargardt's
4) basal laminar drusen

Diferential of drusen
1) basal laminar drusen ("starry sky") - inherited
2) "dominant" drusen
3) ARMD
4) storage diseases (Hunter's; MPS)

Systemic conditions with drusen
renal disorders:
1) Alport's
2) GN type II

DDx of flecked retina syndromes
A) *Genetic diseases*
1) fundus flavimaculatus (AR)
2) Bietti's crystalline dystrophy (AR)
3) retinitis punctata albescens (variant of RP)
4) fundus albipunctata (CSNB variant) (AR)
6) flecked retina of Kandori
7) glycogen storage disease
8) benign familial flecked retina
9) familial flecked retina with night blindness
10) Goldman Favre (AR)
11) cystinosis (AR)
12) hyperoxaluria (AR)

B) *Toxic*
1) canthanxine
2) oxylosis (maybe 2^0 to methoxyflurane)
3) cystinosis?
4) talc retinopathy
5) tamoxifen
6) nitrofurantoin

C) *Due to Drusen*
1) basal laminar drusen ("starry sky") - inherited
2) "dominant" drusen
3) ARMD

Scalloped retinal lesions
1) gyrate atrophy
2) choroideremia
3) paving stone degeneration

Lattice findings
1) floaters
2) dense attachments at edges
3) sclerotic blood vessels
4) atrophic holes
5) RPE hyperplasia
6) discontinuous ILM

Exudative RD's
A) *inflammatory*
1) VKH
2) posterior scleritis
B) *vascular*
1) CSR
2) Coat's disease/ Leber's miliary aneurysm
3) retinal angiomatosis (VHL)
4) choroidal hemangioma
C) *neoplastic*
1) melanoma
2) retinoblastoma
D) *systemic hypertension*
1) malignant hypertension (hypert. choroidopathy)
2) renal failure
3) toxemia of pregnancy
E) *Other*
1) optic pits

Stages of epiretinal membranes:
0) decreased foveal reflex
1) distorted vessels, mb. not seen; retinal striae
2) obscuring of retinal vessels; marked distortion of vessels,
3) visible mb.

Causes of night blindness
A) *Non-retina*
1) myopia
2) glaucoma
3) miotics
B) *Retina*
1) RP
2) choroideremia
3) gyrate atrophy
4) Vit A deficiency
5) meds (chloroquine, phenothiazines)
6) CSNB

E) MANAGEMENT
Grades of PVR (old - 1983)
A) minimal - tobacco dust

B) moderate - rolled edges of retinal breaks
- wrinkling of inner retinal surface

C) marked - full thickness retinal folds in all 4 quadrants
C-1: 1 quadrant to C3 (3 quadrants)
- retina immobile

D) massive - full thickness in all 4 quadrants funnel shaped RD: D1 open funnel D2 (narrow) D3 (closed)

Grades of PVR (new - 1991)

A) vitreous pigment clumps
B) retinal wrinkling, stiffness
C) P 1-12: full thickness folds posterior to equator
A 1-12: full thickness folds anterior to equator

Complications of Silicone oil

1) open angle glaucoma
2) closed angle glaucoma
3) cataract
4) corneal decompensation
5) refractive change
6) retinal toxicity ?

Indications for vitrectomy instead of buckle for retinal detachment

1) media opacity (cataract, VH)
2) PVR
3) tractional RD
4) giant tears
5) posterior tear
6) macular tractional RD
7) combined tractional-rhegmatogenous RD

Indications for vitrectomy

- wait at least 1 month
A) *Vitreous hemorrhage*
1) early vitrectomy in VH in type I DM of (< 20 years duration?) with acuity < 20/800 due to VH
2) monocular patient with VH
3) bilateral vitreous hemorrhage
4) non-clearing VH (after 3-6 months)
B) *Retinal Detachment* - see above
C) *Other*
1) severe NV in DM in eyes with good vision (remove scaffold)
2) macular epiretinal membranes
3) dislocated lens (IOL or crystalline)
4) diagnostic vitrectomy
5) post-op CME due to vitreous to wound
6) macular holes

Indications for vitrectomy in diabetic

A) *Vitreous hemorrhage* > 1 month at least
1) early vitrectrectomy in VH in type I DM of (< 20 years duration?) with acuity < 20/800 due to VH
2) monocular patient with VH
3) bilateral vitreous hemorrhage
B) *Other*
1) severe NV in eyes with good vision
2) macular tractional RD
3) combined tractional-rhegmatogenous RD

Lesions predisposing to retinal detachment

- In decreasing order of risk (somewhat)
- trauma can cause all of these except schisis
- PVD can cause 4-7
1) retinal dialysis (posterior and anterior)
2) retinoschisis
3) traumatic retinal breaks (equatorial)
4) horseshoe tear
5) operculated hole
6) atrophic holes
7) macular holes

Lesions Predisposing to Retinal Tears / RD

1) lattice
2) vitreo-retinal tufts
i) noncystic tufts
Ii) cystic tufts
iii) zonular traction tufts
3) meridional folds
4) enclosed ora bay
5) peripheral retinal excavation
6) white without pressure? (AAO says no)

Tears to treat

1) retinal dialysis
2) subclinical RD (1-2 DD)
3) asymptomatic horseshoe tear in pseudophake, myope, RD in other eye: especially if no PVD yet
4) lattice: only if RD in other eye, no PVD yet; and even then it's debatable (probably treat if having flashes and floaters)

Significant risk factors for RD

1) RD in other eye
2) high myope

3) pseudophakic
4) family history
5) symptoms of flashes and floaters
6) lattice

Management of patients on chloroquine
- 300 g total needed (and more than 250 mg per day)
- causes macular retinopathy
1) baseline VF, color plates (cones), photos
2) possible ERG's
3) follow up Q 6-12 months

Treatment of CRAO
- BRAO 1-3
1) ESR
2) massage
3) Diamox, beta blockers
4) AC tap
5) Carbogen Q 2h for 10 min
** ASA as prophylaxis

Poor prognosis for CSME treatment
1) CME
2) diffuse macular edema
3) macular non-perfusion
4) foveal hard exudates

Treatment of CME
1) NSAIDs (topical and po)
2) steroids (topical, subTenon's and po)
3) Diamox (po)

Workup for retinal capillary hemangioma
1) CT head (cerebellum angioma, meningioma)
2) U/S abdo (renal cell CA, pheochromocytoma)

Time for NV to resolve post PRP
1) 3 days: 20%
2) 3 weeks: 70%

Indications for vitrectomy for macular hole
1) Stage 2-4

Indication for vitrectomy for ERM
1) acuity 20/60 or less