I. PanRetinal Photocoagulation (PRP)
   A. Diabetic Retinopathy Study (DRS)
      1. Proved PRP reduces risk of vision loss in patients with PDR
      2. Especially with High Risk characteristics
   B. Patient preparation
      1. Explain findings/procedure/results DRS
      2. Discuss side effects
   C. Procedure
      1. Topical or retrobulbar anesthesia
      2. Settings
         a. 350um (Rodenstock lens) or 500um (Goldmann lens) spot size
         b. 250-450mW power
         c. 0.1 sec duration
         d. Argon Green laser
      3. Burns placed 1 to 1½ burn-diameter apart from temporal arcades to equator
         a. Attempt to get good pattern and induce regression of NVD
         b. Retina is divided before starting treatment, with inferior retina often treated first
      4. Treat CSME first if also present
   D. Follow-up
      1. Homatropine and antibiotic/steroid combo ung instilled post op
      2. Eye patched if given retrobulbar
      3. Tobradex qid, homatropine qid x 1 week (sometimes)
      4. RTC 4-6 weeks after PRP
         a. If NVD regressed, RTC 3 months
         b. If NVD still active, more laser indicated
         c. Some patients may need vitrectomy despite adequate PRP
   E. Complications
      1. Decreased peripheral vision, night vision, and accommodation
      2. Visual acuity may be reduced 1-2 lines
      3. Need for multiple treatments
      4. Vitreous hemorrhage
      5. CME

II. Focal Macular Laser (FML)
   A. Efficacy shown in EDTRS for patients with CSME
   B. Guidelines for treatment
      1. VA 20/20 to 20/200
      2. Clinically significant macular edema (CSME)
      3. Recent FA to identify leakage and any non-perfusion
C. Patient preparation
   1. Explain findings/procedure/results of EDTRS
   2. Discuss side effects

D. Procedure
   1. Topical anesthesia usually adequate, retrobulbar occasionally
   2. Settings
      a. 50-200um spot size
      b. Goldmann or Yanuzzi contact lens
      c. 100mW to 500mW power
      d. 0.1 second duration
      e. Argon green Laser
   3. Initial laser spots will whiten outer retina
   4. Then 3-4 re-applications to same spot is possible

E. Follow-up
   1. RTC 3-4 months after treatment
   2. Slow resolution, therefore no re-treatment earlier than 3-4 months
   3. Repeat FA if suspect new areas of leakage
   4. After resolution, RTC 4-6 months; monitor macula and possible PDR

F. Complications
   1. Para-central scotomas
   2. CNVM
   3. Immediate vision loss due to misplaced laser spot

III. Branch Retinal Vein Occlusions (BRVO): Macular edema
A. Macular edema often associated with temporal BRVO
B. Edema resolves in 40-50% of eyes w/o treatment in 4-6 months
C. Guidelines for treatment: BRVO Study Group
   1. BRVO at least 3 months old
   2. VA 20/40 or worse
   3. FA demonstrating macula edema and no foveal ischemia

D. Procedure
   1. Topical anesthesia
   2. Settings
      a. 100-200um spot size
      b. Goldmann or Yanuzzi contact lens
      c. 150mW, increased in 50mW
      d. 0.1 second duration
      e. Argon green Laser

E. Follow-up
   1. RTC 4 months after treatment
   2. If persistent macula edema and decreased VA, repeat FA
   3. Several treatment often necessary
   4. RTC every 6-12 months after edema resolved

IV. BRVO: Neovascularization
A. BRVO study group concluded that PRP useful in eyes with NV
   1. No advantage to treat prophylactically
   2. Less aggressive treatment if complete PVD present
B. Procedure
   1. Topical anesthesia
   2. Settings
      a. 200-500um spot size
      b. Rodenstock lens
c. 200mW power, increased in 50mW steps
d. 0.1 second duration
e. Argon green laser

C. Follow up
1. RTC 4-6 weeks after laser
2. If no regression of neo, consider adding more PRP
3. Once regression, RTC 6-12 months

D. Complications: similar to PRP, but less depending on amount of laser

V. Choroidal Neovascular Membranes (CNVM)

A. Macular Photocoagulation Study
1. multi-centered study to evaluate laser photocoagulation in patients with CNVM from either ARMD or POHS
2. Laser treatment reduced visual loss if CNVM >200um from FAZ
3. Did not prove effective if CNVM extends beneath center of FAZ

B. Procedure
1. Retrobulbar (usually) or topical anesthesia
2. Settings
   a. 200-500um spot size
   b. Planoconcave or Yanuzzi contact lens
   c. 200mW power
   d. 0.2-0.5 second duration
   e. Argon green or Krypton red laser
3. Burns should be confluent and cover entire lesion
4. Should overlap edges by 100um unless too close to FAZ
5. Compare to FA to ensure entire lesion is covered

C. Follow-up
1. RTC 2-3 weeks for post-treatment FA
2. Treat any persistent or recurrent CNVM promptly, if not under FAZ
3. RTC monthly, until leakage subsides
4. If no further leakage, RTC 6-12 months
5. Home Amsler Grid with instructions to call if changes

VI. Retinal Breaks

A. Occur in 3-7% of adult population
1. Usually asymptomatic
2. 1-2% with breaks progress to detachment

B. Indications for treatment (see algorithm)
1. Atrophic holes and simple lattice generally not treated unless other risk factors
   a. high myopia
   b. aphakia/pseudophakia
   c. trauma
   d. RD in fellow eye
2. Consider early prophylactic treatment for superior lesions
3. Consider treatment of lattice, holes, or tears prophylactically before intraocular surgery
4. Flap tears are generally treated in most patients (may follow asymptomatic in phakic patient)

C. Procedure
1. Topical or retrobulbar anesthesia
2. Settings
   a. 200-400um spot size
   b. 3-mirror, 4-mirror, or Panfundus contact lens
   c. 150mW power
d. 0.1-0.2 second duration
e. Argon green or Krypton red laser
3. Entire lesion should be enclosed by at least 3 rows in a honeycomb pattern
4. Adhesion present 24 hours after surgery, but strengthens over several days

D. Follow-up
1. RTC 1-2 weeks after laser for symptomatic tears
2. 3-4 weeks if asymptomatic
3. If larger or superior, follow up even sooner
4. If enlargement of break or new subretinal fluid, retreat
5. RTC 6-8 weeks if stable at first follow-up
6. After stable, RTC yearly (depending on comfort level)

E. Complications: Very few
1. Inadequate burn intensity
2. Possible CNVM
3. Intraretinal/Vitreous hemorrhage
4. ERM formation

VII. Central Serous Retinopathy (CSR)
A. Three separate clinical studies proved that photocoagulation to area of leakage can shorten duration of disease
1. Does not improve final VA
2. SRNVM may develop from laser burn, causing permanent loss of vision
B. 80% of cases will recover with no treatment within 6 months
C. Therefore, treatment of CSR < 6 months duration is not recommended
D. No treatment recommended unless compelling reasons!

VIII. Others
1. Angiomatosis Retinae
2. Coats Syndrome
3. Idiopathic Juxtafoveal Telangiectasis
4. Acquired Retinal Macroaneurysms
5. Choroidal Hemangioma

Guidelines for management of retinal breaks and lattice degeneration
(from: Weingeist TA. Sneed SR. Laser Surgery in Ophthalmology)

Retinal lesion
  /\    \
Lattice/ atrophic hole   flap tear
  |    |
Symptomatic   Asymptomatic   Symptomatic   Asymptomatic
  |    |
SRF       No SRF   Fellow Eye   SRF       No SRF   Phakic SRF or traction High myopia Fellow eye Aphakia/ pseudophakia
treat     consider    treat       consider    follow    treat       follow    treat    treat    treat    treat

SRF=Subretinal fluid