Evaluation of the Retina and Posterior Segment
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Presentation Structure:
Part I - Examination Techniques
Part II - Examination Interpretation (including normal retina and anomalies)
Part III - Peripheral Retina with Scleral Indentation - Case Presentations
Part IV - Video Demonstration of BIO Techniques and Scleral Indentation

Learning objectives:
1) Appreciate and be able to apply techniques for improving skills in the examination of the peripheral retina including scleral indentation.
2) Understand the anatomy of the tissues in the peripheral retinal zone.
3) Understand the etiology, histopathology, and appearance of both congenital and acquired peripheral retinal variations.
4) Understand the clinical management of peripheral retinal variations.

I - Examination Techniques
History of exam techniques
- direct ophthalmoscopy introduced in 1850 by Helmholtz
Monocular indirect ophthalmoscopy
- indirect ophthalmoscopy introduced in 1852 by Ruete
Contact lens
- use of a contact lens for fundus exam perfected in 1938 by Goldmann
Binocular indirect ophthalmoscopy
- introduced and popularized by Dr. Charles Schepens 1940's
Scleral indentation
- technique first described in 1900 by Trantas, advanced and popularized by Schepens in 1940's

II - Examination Interpretation
Retinal and peripheral retinal anatomy
- retina, choroid, ora serrata, pars plana, pars plicata, vitreous

Variations of fundus appearance
Body pigmentation

Refractive error

Aging changes in the peripheral fundus

Cystoid changes

Typical cystoid degeneration
- most common of periph. retinal degens (100% over 20yrs)
- cystic spaces in inner retina - can coalesce
- if ruptures then retinal excavation
- very rarely causes any problem (i.e., RD)

Typical degenerative retinoschisis (acquired)
- split in neurosensory retina (usually outer plexiform layer)
- typically smooth domed-shaped lesion
- retinoschisis cavity fluid filled and optically clear
- snowflake lesions on dome’s ceiling surface
- vessel’s often sheathed
- retinoschisis dome does not shift with gravity
- 3.5% of adults, bilateral 33% to 82% of individuals
- 72% in inferior temporal quadrant (28% sup-temp)
- monitor unless inner and outer retinal breaks - consult

Pars plana cysts
- oval or round transparent elevations
- cystoid spaces between pig and non-pig epithelium
- range in size from 0.25 to 2.5 DD
- usually in posterior half of pars plana
- patients over 40, 24% have at least one & 33% bilateral
- appear to be unrelated to retinal pathology

Chorioretinal degeneration

Honeycomb degeneration (peripheral tapetochoroidal degen)
- rpe disturbance running circumferentially at equator
- irregularity of pigment forming lines in honeycomb
- causes no problems
- patients over 40, approx. 20% (bilateral 100%)

Equatorial drusen
- yellow-white colloid bodies of the rpe
- more common than macular drusen
- can occur singly, in clusters, or geographic pattern
- usually no problem (rarely assoc. with subret neovasc)
- origin of drusen still debated

White-without-pressure
- areas of peripheral retina with whitish translucent appear.

Chorioretinal atrophy

Paving-stone degeneration
**Classification of peripheral retinal variations based on main pathogenic mechanism**

**Developmental**
- Peripheral retinal degenerations
  - **Trophic** - vascular, metabolic, or nutritional disturbance
  - **Tractional**
  - **Trophic and tractional**

**Developmental** variations of the peripheral fundus
- Variations of ora serrata - bays and teeth (dentate processes)
  - Meridional folds
    - radial pleats of peripheral neurosensory retina underlying vitreous base
    - 26% incidence after age 1 year.
    - 70% assoc with dentate processes (tooth folds or dentate folds)
    - 30% assoc with bays
    - meridional fold assoc with dentate process and aligned with a large ciliary process = a meridional complex
- Noncystic retinal tuft (tag)
  - thin, short, internal projection of retinal tissue with vit attach at apex
  - usually located within posterior portion of vitreous base
  - base usually less than 0.1mm in diameter
  - underlying rpe normal
  - 72% incidence, bilateral 50%
  - commonly inferior nasal quadrant
  - not as a rule assoc with retinal breaks
- Cystic retinal tuft (granular globule, patch)
  - plaque, globule, or nodule of peripheral retinal tissue
  - projects into the vitreous body
  - larger than the noncystic tuft
  - within vitreous base and commonly assoc with a meridional fold
  - condensed vit may be at apex and dispersed underlying rpe common
  - 59% incidence, bilateral 39%
  - rarely associated with retinal breaks
- Ora serrata pearls
  - pinpoint-sized, round, glistening, yellow-white structures
  - located near ora (in dentate process, pars plana, or retina)
  - most commonly superior temporal quadrant and horiz meridians
  - 20% of adult eyes
  - not assoc with any ocular path

**Trophic** retinal degenerations
- Retinal holes
  - retinal discontinuities that have no tractional element in origin
  - usually round with smooth edges, hole appears red
  - no associated tear or operculum

  - get consult if:
- symptomatic (i.e., phosphenes)
- patient has risk factors such as:
  - pseudophakia
  - previous retinal complications
  - high myopia
  - family history of retinal detachments
  - vitreous dynamics in question
  - if there is an elevated subretinal cuff
  - if diameter of hole (or hole plus any subretinal fluid) is greater than 2mm (IDD = 1.5mm)

Typical cystoid degeneration (already covered)
Acquired typical degenerative retinoschisis (already covered)
Paving-stone degeneration (cobblestone degen, chorioretinal degen)
  - discrete yellow-white chorioretinal lesions (0.1 to 1.5mm)
  - located between equator and ora serrata
  - loss of pigment in rpe
  - subjacent choroidal vessels often visible
  - may be single lesions or may coalesce forming scalloped borders
  - border of lesion often hyperpigmented due to pig migration
  - no overlying abnormal vitreous adhesion
  - incidence increases with age
  - approx 25% incidence in adults over 20 years age
  - incidence peaks in fifth to seventh decade
  - only very rarely associated with retinal breaks

Peripheral tapetochoroidal (honeycomb) degeneration (already covered)
Equatorial drusen (already covered)

**Tractional** retinal degenerations
Partial-thickness tears
  - don’t usually cause an RD, but may lead to retinal and vit hems
  - get consult

Full-thickness tears
  - have a retinal flap or overlying vitreous operculum
  - have abnormal vitreoretinal traction forces
  - get consult

**Trophic and tractional** retinal degenerations
White-without-pressure (WWOP)
  - areas of peripheral retina that have a whitish translucent watered-silk appearance
  - etiology remains obscure but thought to involve vitreal traction
  - more frequent in darkly pigmented fundi
  - lesions located between ora and equator
  - edges of these geographic lesions are commonly very sharply demarcated
  - not found to be associated with retinal holes, tears, or detachments
- areas of normal retina within WWOP can be mistaken for retinal hole

Snail-track degeneration (*Schneckenspuren*)
- some consider it a form of lattice, others classify it separately
- crinkled or frosted appearance on inner surface
- unlike lattice, snail-track lacks assoc pig changes or whites vessels
- shares the 3 following characteristics with lattice:
  - thinned retinal tissue
  - overlying liquified vitreous dome
  - abnormally adherent vitreous attachments at border of lesion
- atrophic holes can be present within lesion

Lattice degeneration
- Gonin first described in 1904 as *Schneckenspuren* and in the 1950's renamed “lattice retinal degeneration”
- lesions can have various appearance
- 92% have some pigmentary disturbance including pigment clumping, depigmented zones, and perivascular pigment
- white appearing “lattice” blood vessels in 46% of lesions (sheathing of vessels caused by oblitative fibrosis)
- 2/3's of lesions found in peripheral retina in 11-1 & 5-7 o’clock zones
- majority of lesions elongated with long axis parallel with equator
- 18-31% of lesions contain retinal holes
- lesions present in 6-7.9% of adult population
- more common in myopic eyes (incidence increases with increased axial length)
- onset of lesion usually in second decade of life
- bilateral in 33-50% of cases
- lattice believed to be the major cause of 21% of retinal detachments
- most of patients who develop rd’s from lattice are over 50 years of age

Degenerative conditions of the vitreous

Asteroid hyalosis
- white spherical particles embedded in vitreous body
- 27% of asteroid patients are diabetic only 5.4% of diabetics have asteroid
- unilateral in 75% of cases

**III - Peripheral Retina with Scleral Indentation - Patient Slides**

**IV - Video Demonstration of Scleral Indentation**

This video demonstrates the procedures and techniques for obtaining good binocular indirect views of the fundus. Techniques for successful scleral indentation will be shown. Views of the peripheral fundus during scleral indentation will be highlighted.