PATHOLOGICAL CORRELATES OF MYOPIA

TEAR WITH DETACHMENT

FUCH’S SPOT

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ACBO  2009
OCULAR : ISSUES IN DAILY PRACTICE

- Risk of retinal detachment
- Foster- Fuch’s spot  Refer early ?VEGF drugs
- Disc changes / Staphyloma
- Symptomatic floaters
- Worrying signs / symptoms
- Difficulty of scleral indentation

NON- OCULAR

- ORBITAL
- SYSTEMIC
OCULAR CHANGES IN MYOPIA

As axial length increases, there is an increasing disparity between surface area of retina $4\pi r^2$ and volume $4/3 \pi r^3$.

Pathology more common with increasing myopia esp $> -6$
5 fundus changes are associated with increased axial length of the eye.

- **Optic nerve crescent**
  Not visually threatening – can be confusing
- **Chorio- retinal atrophy**
  Common. Not visually threatening.
- **Central pigment spot (Fuchs's)**
  Uncommon. Can be visually threatening.
- **Lacquer cracks**
  Uncommon. Can be visually threatening.
- **Posterior staphyloma**
  Not visually threatening – can be confusing
Myopic discs

100% of all eyes >28.5mm

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<th>OPTIC NERVE CRESCENT: TYPE AND INCIDENCE</th>
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<td>APPEARANCE (LEFT EYE)</td>
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| APPEARANCE (LEFT EYE)                  |
| NAME                    | NASAL-INFERIOR | TEMPORAL-INF.-NASAL | NASAL-ANNULAR | INFERIOR-ANNULAR | SUPERIOR | TEMPORAL-NASAL |
| ALL CRESCENTS TOTAL 1032 | <1%             | <1%                  | <1%            | <1%              | <1%      | <1%            |
| CRESCENTS WITHOUT PERIPAPILLARY ATROPHY 841 TOTAL | <1% | <1% | <1% | <1% | <1% | <1% |
Central Pigment Spot (Fuchs's)

• A black area of variable diameter at the macula occurs in ~5% of eyes ≥ 26.5 mm or more axial length
Lacquer cracks
Posterior staphyloma
Classic pathology paper
Grossinklaus & Green

• 308 eyes with pathological myopia
• 285 postmortem. 23 surgical...over 67 y!
• Myopic disc 38%
• Post staphyloma 35%
• Degenerative vitreous 35%
• Cobblestone 14%
• Myopic degeneration of retina 11%
• Retinal detachment 11%
• Retinal pits, holes, tears 8%
• SRNV 5%
• Lattice 5%
• Fuch’s spot 3%
• Lacquer cracks 0.6%

Surgical:
Degeneration after ret det
2ary glaucoma
Endophthalmitis
Expulsive h’age
Epithelial ingrowth
Degen after cataract surgery
Presumed tumour
FIGURE 2. Right eye of a 41-year-old woman, with refraction of -17 diopters. Best-corrected visual acuity of the right eye was 20/400, and the axial length was 25.7 mm. (Left) Scars from photocoagulation performed 10 years earlier are evident in the perifoveal area. The arrow indicates the area of the optical coherence tomographic scan. (Right) Optical coherence tomography shows a retinal detachment at the fovea. The overlying retina has retinoschisis in the perifoveal area.
OCT redefining pathology

Retinoschisis

Figure 2. Case 2. Retinoschisis (arrow) is evident in the right eye at both (a) cross-sectional B-scan and (b) three-dimensional visualization.
FIGURE 4. Right eye of a 70-year-old woman, with refraction of −26 diopters. Best-corrected visual acuity of the right eye was 20/400, and the axial length was 28.5 mm. (Left) The fundus has retinochoroidal atrophy within the staphyloma. The arrow indicates the area of the optical coherence tomographic scan. (Right) Optical coherence tomography shows a localized retinal detachment at the fovea. The detached retina has retinoschisis. A columnar structure bridges the inner and outer retinal layers.
Figure 1. Case 1, right eye. Peripapillary detachment of the pigment epithelium (asterisk) and vitreoretinal traction (arrow) in a highly myopic eye, as imaged at both (a) cross-sectional B-scan and (b, c) three-dimensional spectral domain OCT (SD-OCT) views with different degrees of rotation. Case 1, left eye. Peripapillary detachment of the pigment epithelium (asterisk) in high myopia imaged with (d) cross-sectional B-scan and (e, f) three-dimensional SD-OCT visualization. An optically empty space is located beneath the retinal pigment epithelium (RPE). In the macular area, a small retinal detachment (arrowhead) and a cleavage of the neuroepithelium (arrow) are present at both (g) longitudinal OCT scan and (h) three-dimensional SD-OCT.
Potential blinding disease in myopia

CNVM:
- 5-10% of high myopes

Vitreoretinal:
- Floaters
- Earlier PVD
- Lattice
- Retinal tears/ detachment
Daily issues
Worrying signs / symptoms

• Risk of retinal detachment
• Foster- Fuch’s spot ?VEGF drugs
• Symptomatic floaters
• Difficulty of scleral indentation

Be quick to refer to a retina specialist

Delayed treatment can compromise outcome
Medico Legal obligations of an optometrist to detect retinal detachment & pre-detachment disease

1.

- WCF in 20’s
- Previous low myope: PRK. Re-treatment.
- Retina examined by 2 ophthalmologists associated with PRK
- Consulted optometrist ~2y later with decreased VA: diagnosed CSR, missed retinal detachment
Medico Legal obligations  2

• One opinion: Optometrist NOT liable for missing ret det.

• NOT part of optometry competency
ASSOCIATIONS OF HIGH MYOPIA IN CHILDREN
Marr...Ainsworth Eye, 2001 Birmingham

• N=112. <10yo. ≥ -6DS. ≥ 12 mo followup
• ERG if reduced BCVA, nystagmus, ?night blindness
• M sl> F
• 58% Caucasian. 38% Asian [Birmingham 15%]
• Only 10 referred from optometry
• 89% bilateral high myope. 11%: unilateral
• 32% aniso ≥ 2DS
• No spontaneous decrease in myopia
Family history
Marr...Ainsworth

- Eye problem 44%
- 29% myopia
- 10: **Marfan**, juvenile cataract, high myopia, Stickler synd, nyctalopia
- 4: Marfan or Stickler subsequently diagnosed in other family members
ASSOCIATIONS
Marr...Ainsworth

• 8% ‘simple high myopia’
• 54% systemic association
• 56% orthoptic problem [amblyopia, strab, nyst]
• 34% ocular abnormality
Ocular abnormality
Marr...Ainsworth

- Anisometropic amblyopia 32%
- Strabismus 18%
- Nystagmus 12%
- ROP stage ≥3: 7%
- Retinal dystrophy 7% [cone dystrophy, CSNB, Stargardt’s]
- Coloboma 5% + MGDAnomaly 1%
- Glaucoma / Oc Ht 3%
- Cataract 4%
- Subluxed lens 4%
- Albinism 2%
- Microphthalmos, aniridia, spherophakia, post lenticonus, persistent pupillary membrane, traumatic lenticonus....all 1%
Systemic associations
Marr...Ainsworth

- Severe devptl delay 12%
- Extreme prematurity 10%
- Stickler’s 8%
- Down’s 5%
- Marfan’s 5%
Stickler’s

Eye
• Myopia
• POAG
• Cataract
• Vitreoretinal changes predisposing to ret det

Face
• Midfacial flattening
• Small chin
• Cleft palate
Stickler’s

**SEMINAL**
1. Empty vitreous
OR
2. Abn beaded vitreous

Lattice
‘Snail track’
Increased V-R adhesion @ edges
Retinal thinning
Stickler’s

- Very underdiagnosed
- Commonest cause of inherited retinal detachment
- Av age @ diagnosis: Child 4, Adult 32
UNILATERAL HIGH MYOPIA
Weiss BJO  2003

• N=48. mean age 7y [4m to 17y]
• Mean anisomyopia - 9± 4 DS
• 16 ET, 11 XT
• 30% abn optic nerve [hypoplasia, myel nerve fibres, atrophy, coloboma]
• 21% abn CNS
• 12% abn lens
• 10% ROP
• 6% FH high myopia
• 6%: NO associated factors
Myopia- associated esotropia

• 2 types:
• 1. Bielschowsky.
  Antedates modern diagnostic tests
• 2. ‘Heavy Eye’.
Case 1: Eye is turned IN & DOWN

Preoperative
Looks ‘Heavy’ hence Heavy Eye

Postoperative (52 days after surgery)
Definition of Progressive Esotropia Caused by High Myopia

- Presence of high myopia with an axial length sometimes greater than 30 mm.
- Abduction and elevation are limited
Case 2

Preoperative

Postoperative OS (69 days after surgery)
Coronal MRI Scans of Case 2
Measuring the Angle of Dislocation of the Eyeball

Preoperative

Postoperative

The center positions were measured with Scion Image® software.
Joining the SR and LR
After Splitting (into halves)

17 Sep 1999
Pathological associations

Thank you