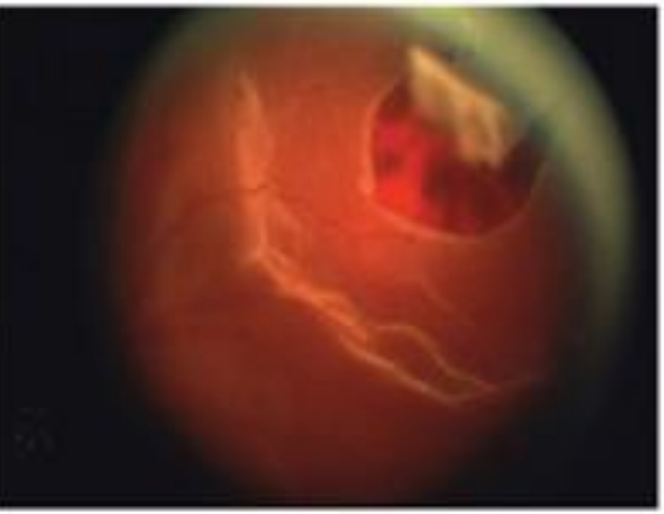
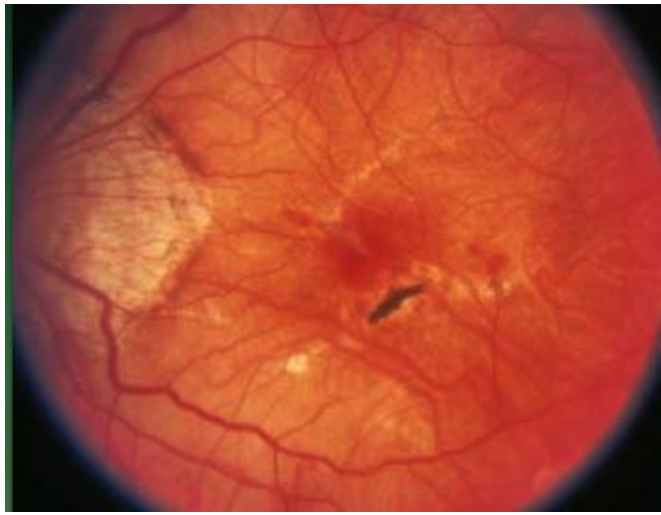
PATHOLOGICAL CORRELATES OF MYOPIA



TEAR WITH DETACHMENT



FUCH'S SPOT

LIONEL KOWAL

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**

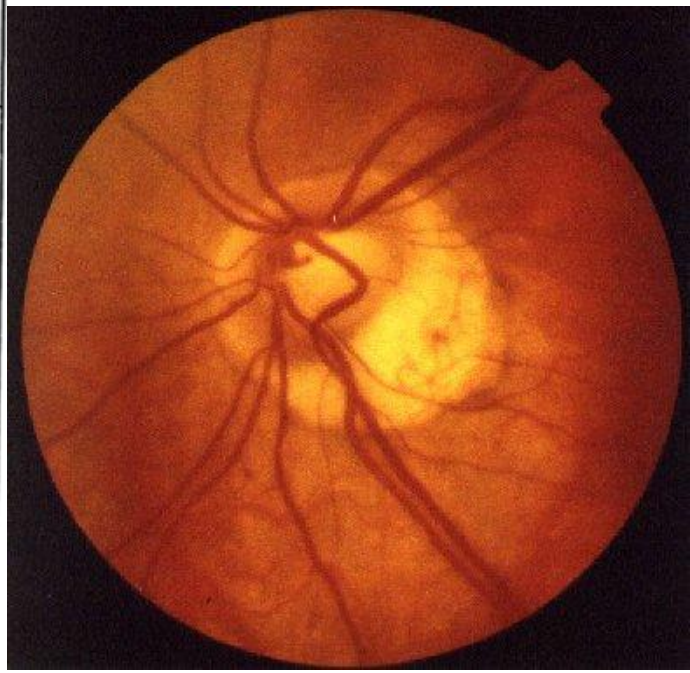
Uncommon. Can be visually threatening.

- **Posterior staphyloma**

Not visually threatening – can be confusing

Myopic discs
100% of all eyes >28.5mm

OPTIC NERVE CRESCENT: TYPE AND INCIDENCE						
APPEARANCE (LEFT EYE)						
NAME	TEMPORAL	ANNULAR	NASAL	TEMPORAL-ANNULAR	INFERIOR	TEMPORAL-INFERIOR
ALL CRESCENTS TOTAL 1032	62%	25%	3%	2.7%	2.5%	2.3%
CRESCENTS WITHOUT PERIPAPILLARY ATROPHY 841 TOTAL	71%	17%	2.9%	2.4%	2.7%	2.2%
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

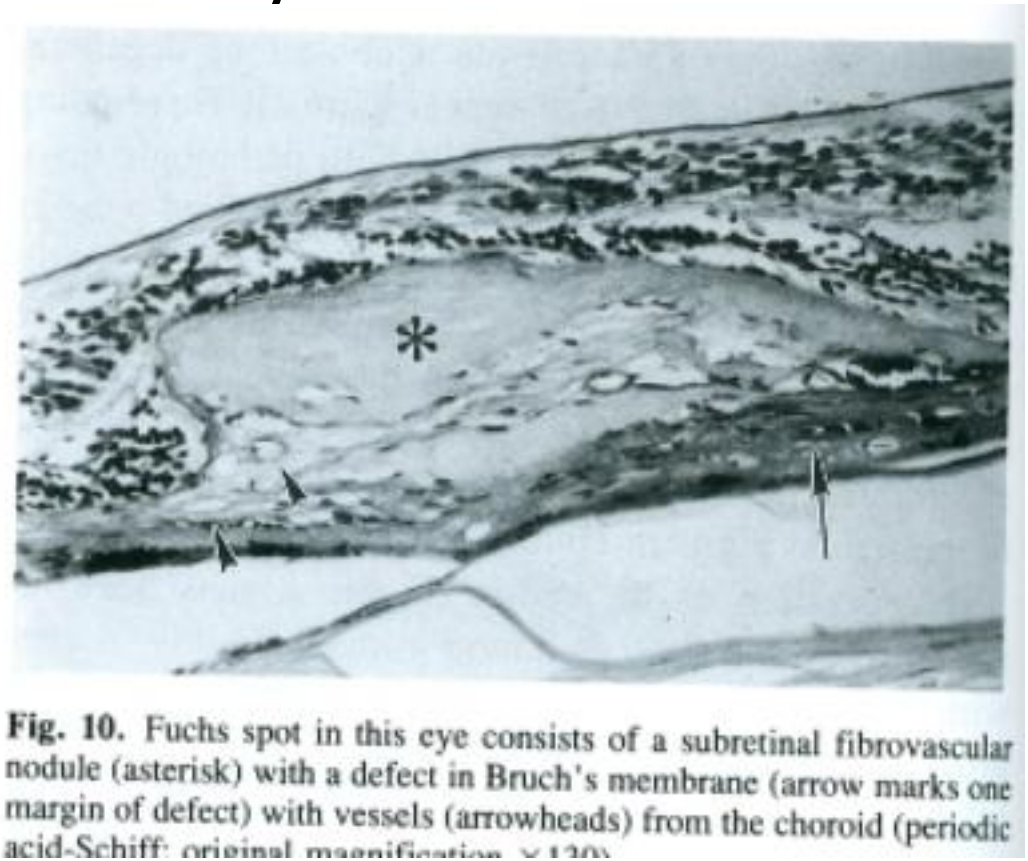
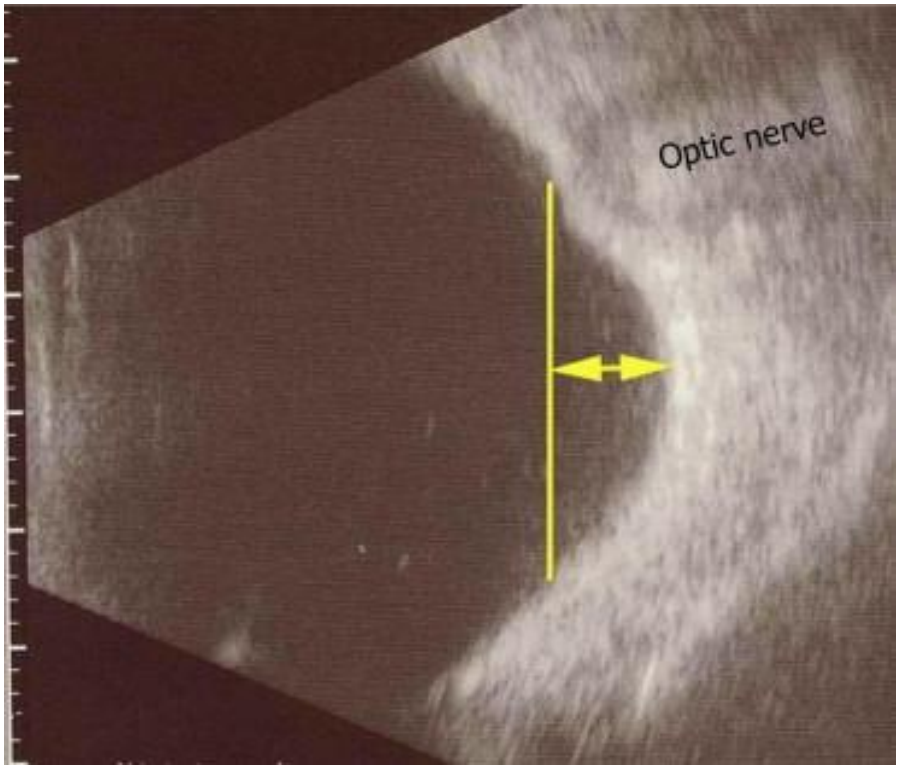


Fig. 10. Fuchs spot in this eye consists of a subretinal fibrovascular nodule (asterisk) with a defect in Bruch's membrane (arrow marks one margin of defect) with vessels (arrowheads) from the choroid (periodic acid-Schiff; original magnification ×130).

Lacquer cracks

Posterior staphyloma



Classic pathology paper Grossinklaus& Green

- 308 eyes with pathlogical 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

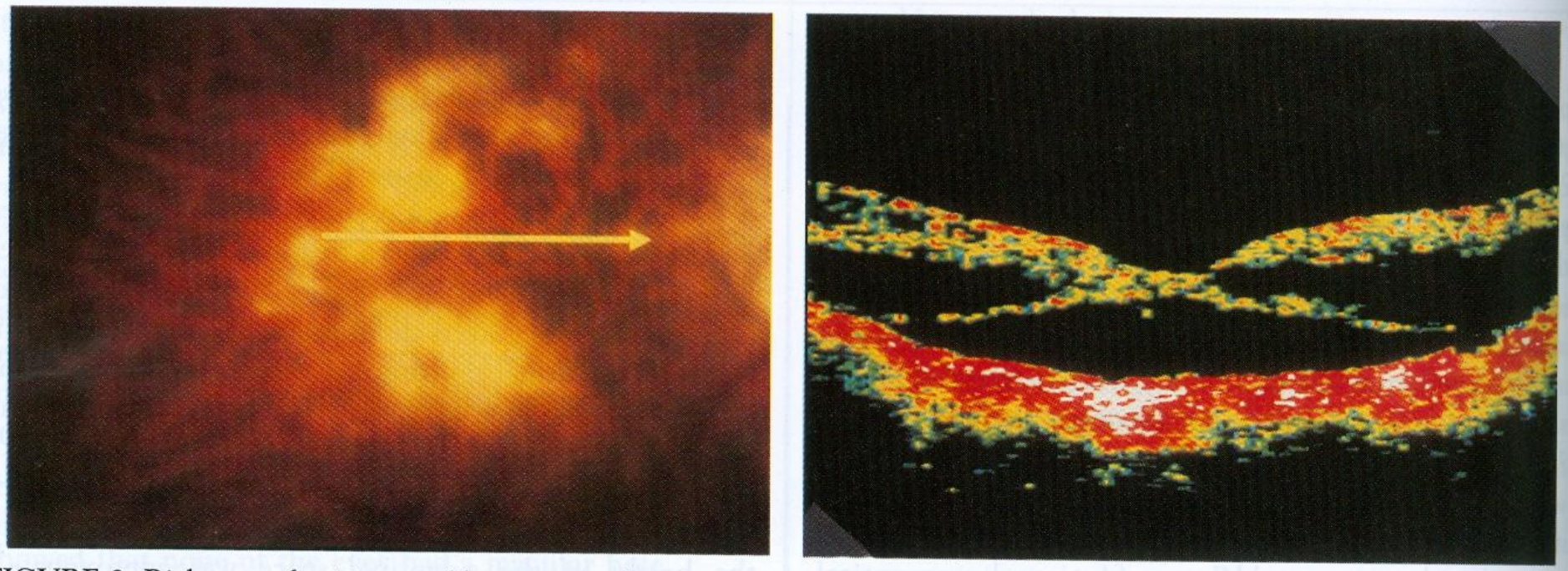


FIGURE 2. Right eye of a 41-year-old woman, with refraction of −17 diopters. Best-corrected visual acuity of the right eye was 20/400, and the axial length was 25.7 mm. (Left) Scars from photocoagulation performed 10 years earlier are evident in the perifoveal area. The arrow indicates the area of the 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

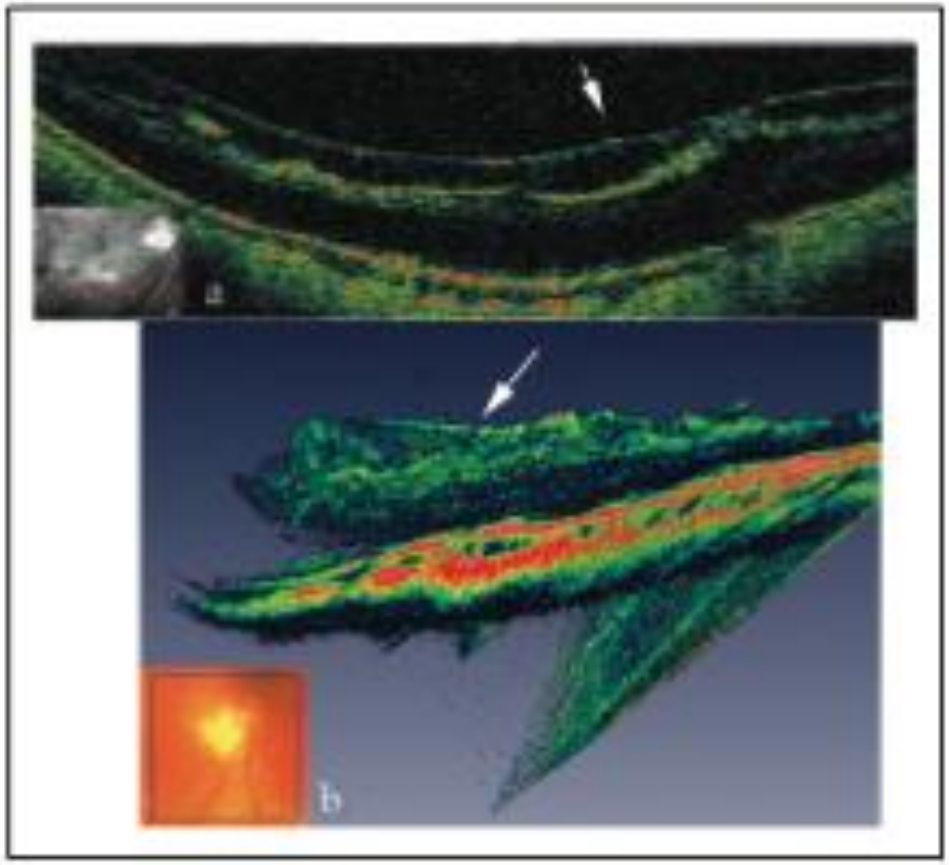
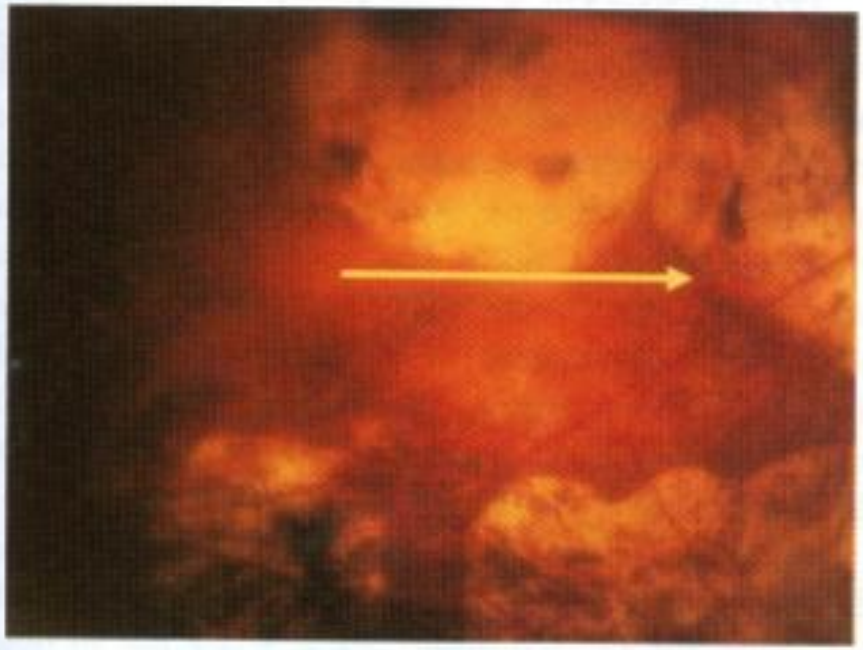
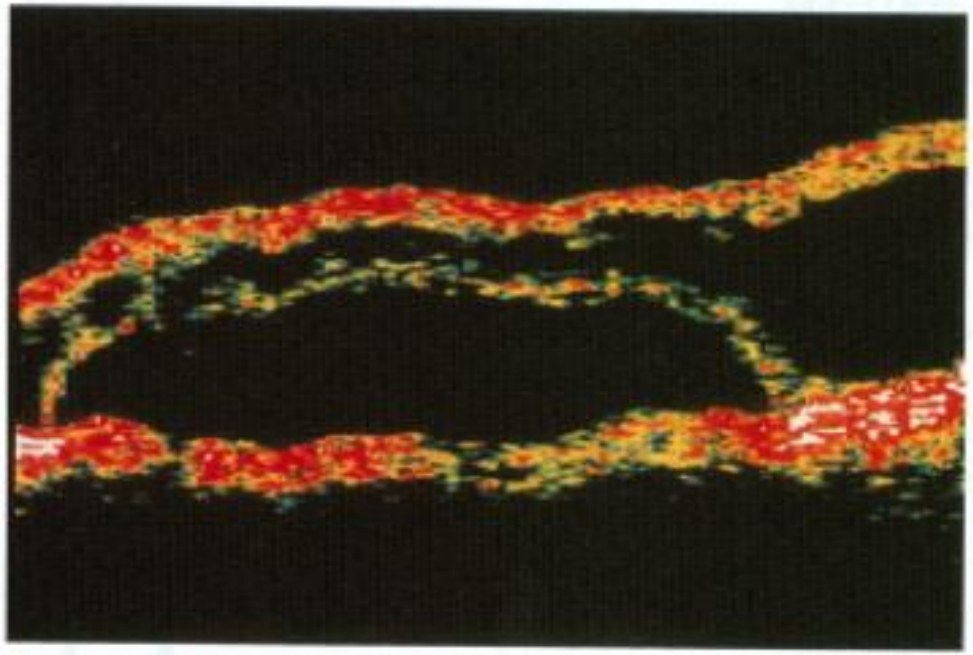


Figure 2. Case 2. Retinoschisis (arrow) is evident in the right eye at both (a) cross-sectional B-scan and (b) three-dimensional visualization.





GURE 4. Right eye of a 70-year-old woman, with refraction of −26 diopters. Best-corrected visual acuity of the right eye wa
/400, and the axial length was 28.5 mm. (Left) The fundus has retinochoroidal atrophy within the staphyloma. The arro
dicates the area of the optical coherence tomographic scan. (Right) Optical coherence tomography shows a localized retina
tachment at the fovea. The detached retina has retinoschisis. A columnar structure bridges the inner and outer retinal layers

Vitreo retinal traction

Peri Papillary detachment

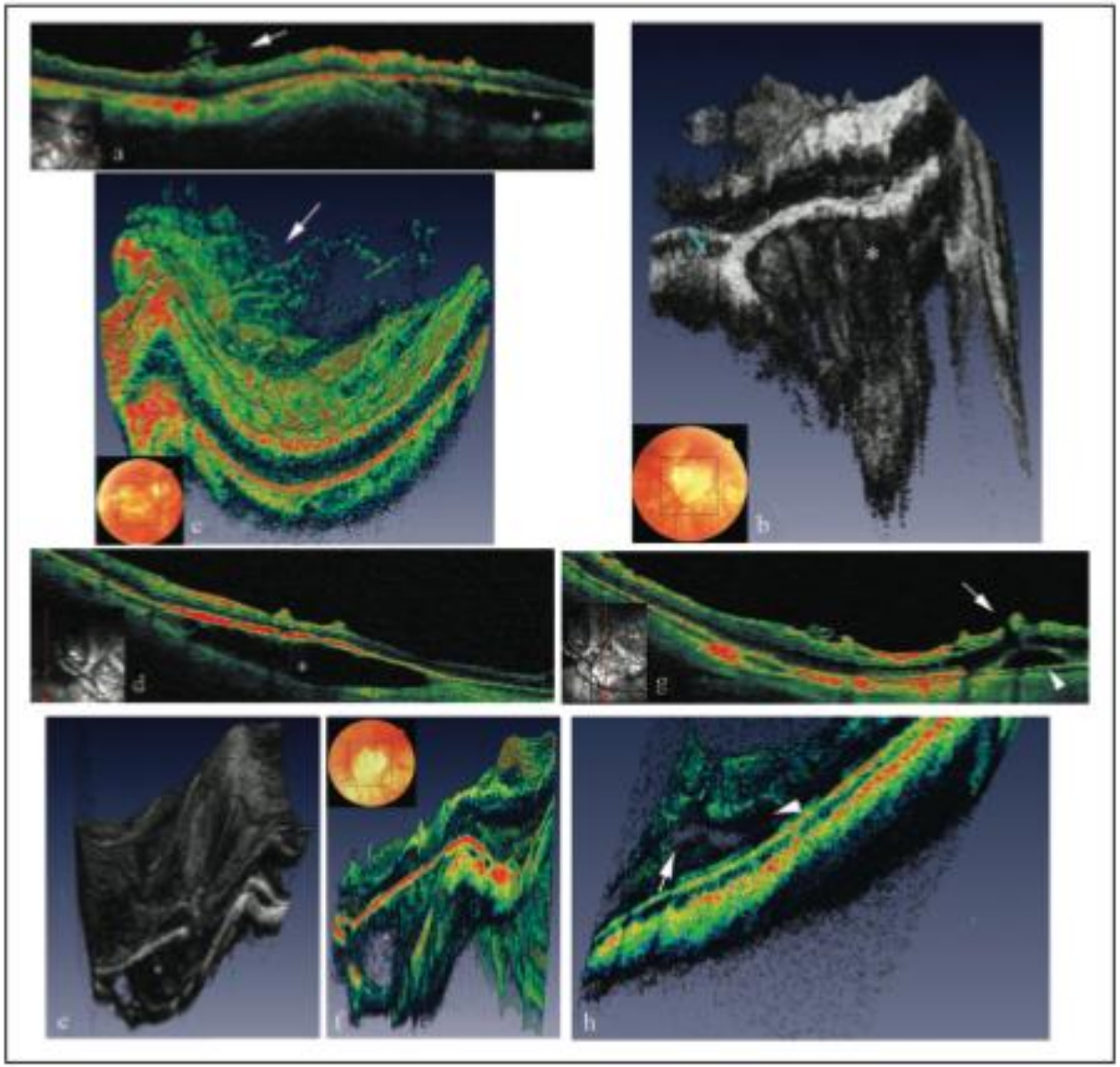


Figure 1. Case 1, right eye. Peripapillary detachment of the pigment epithelium (asterisk) and vitreoretinal traction (arrow) in a highly myopic eye, as imaged at both (a) cross-sectional B-scan and (b, c) three-dimensional spectral domain OCT (SD-OCT) views with different degrees of rotation. Case 1, 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


Retinal Tear with Detachment

- 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

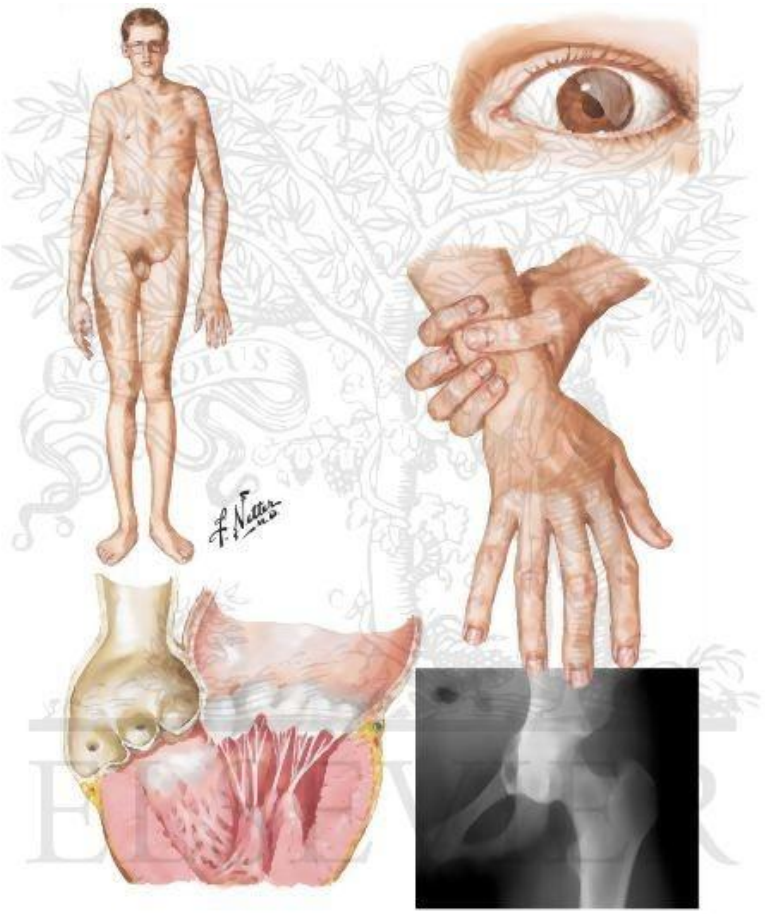
ASSOCIATIONS OF HIGH MYOPIA IN CHILDREN
Marr…Ainsworth Eye, 2001 **Birmingham**

- 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%

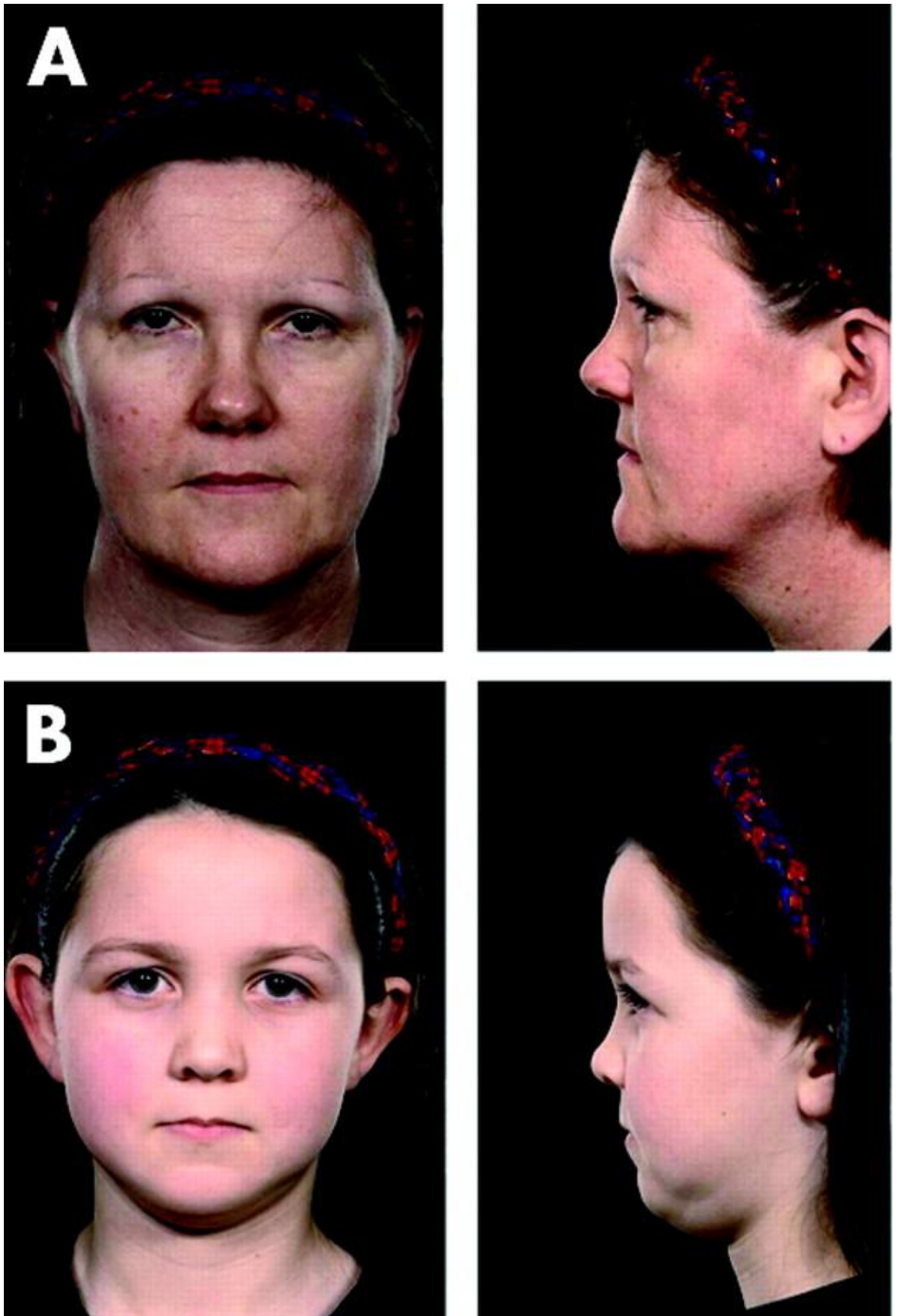
Stickler's

Eye

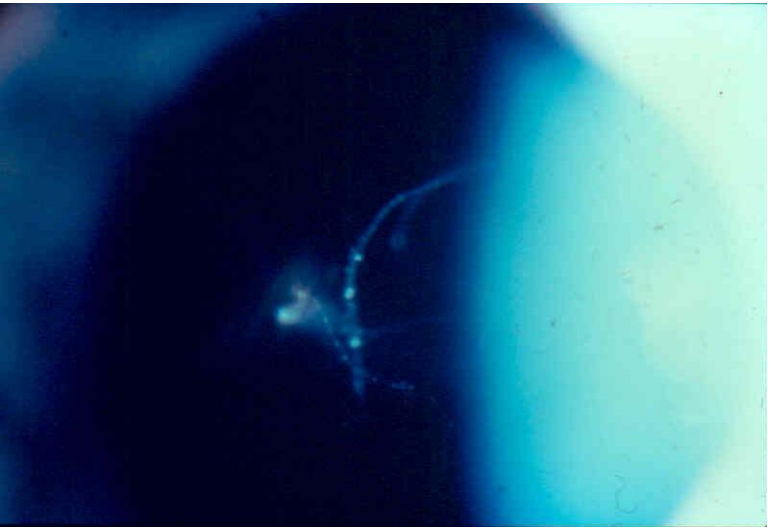
- **Myopia**
- **POAG**
- **Cataract**
- **Vitreoretinal changes** predisposing to ret det

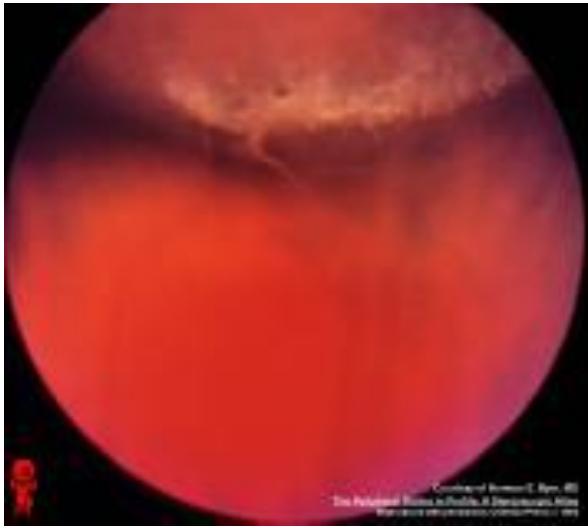
Face

- 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

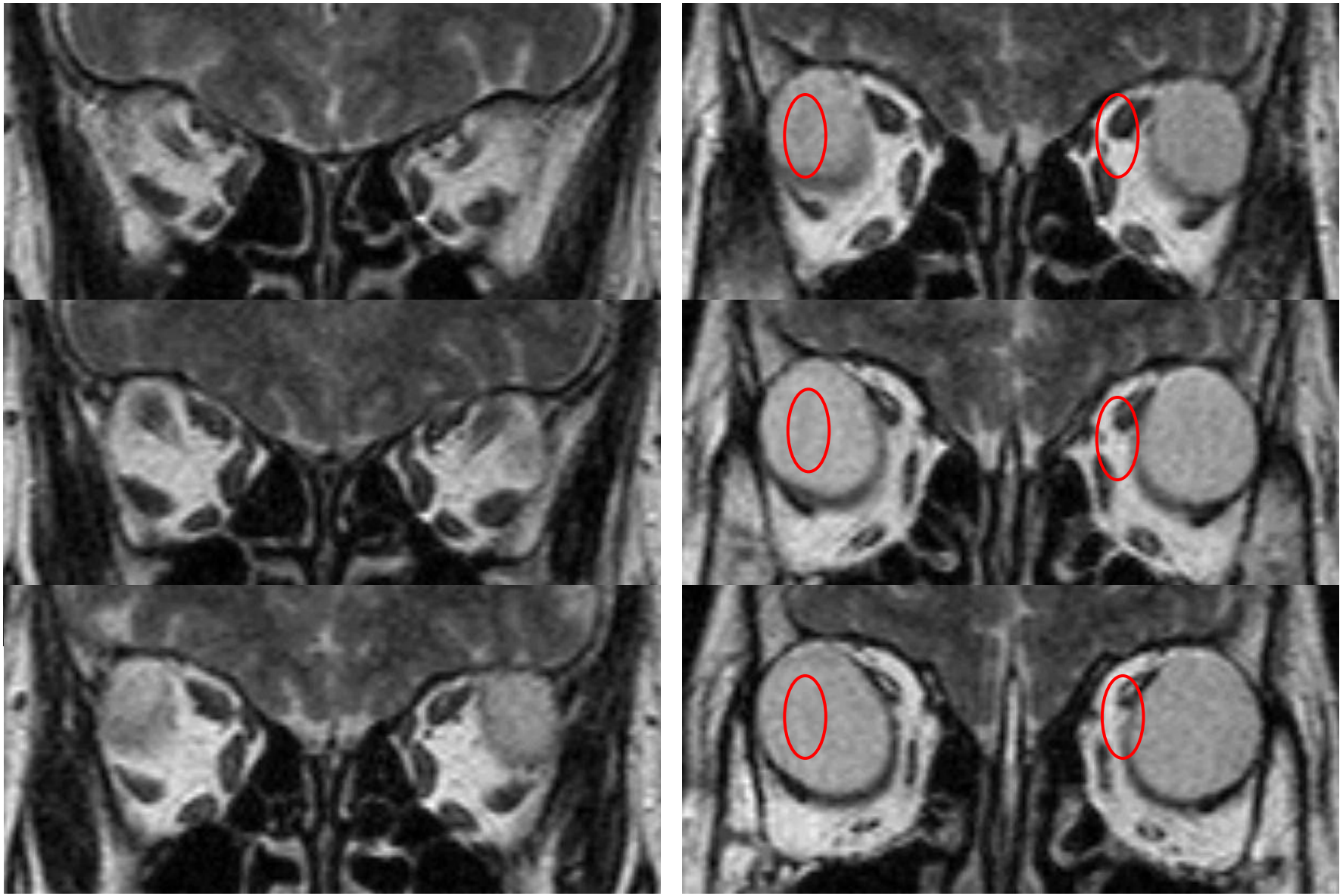
- *Presence of high myopia with an axial length sometimes greater than 30 mm.*
- *Abduction and elevation are limited*

Case 2

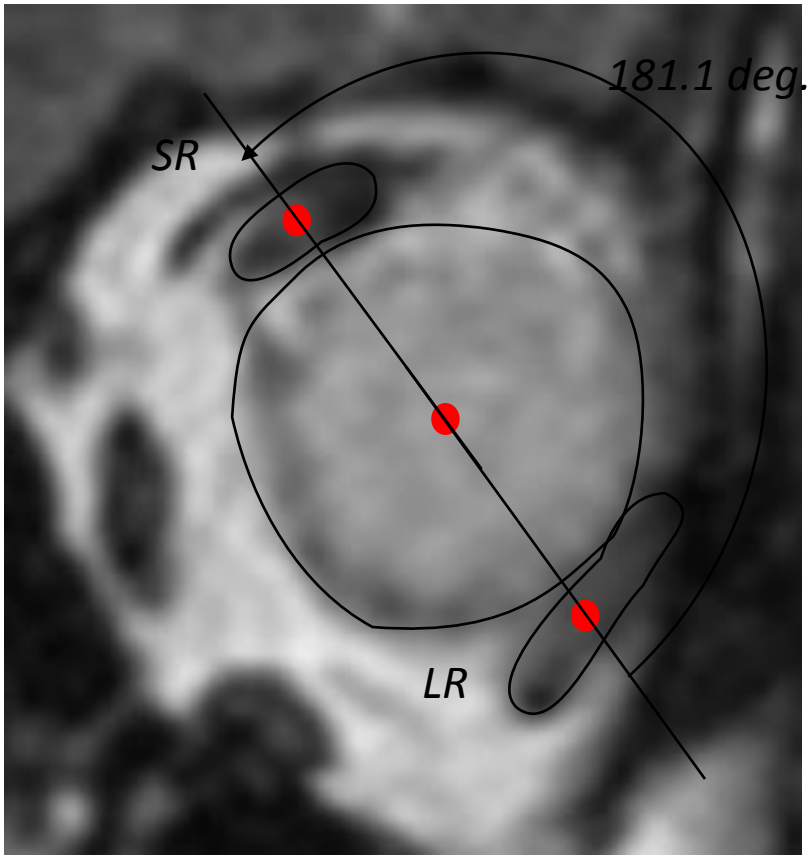
Preoperative

Postoperative OS (69 days after surgery)

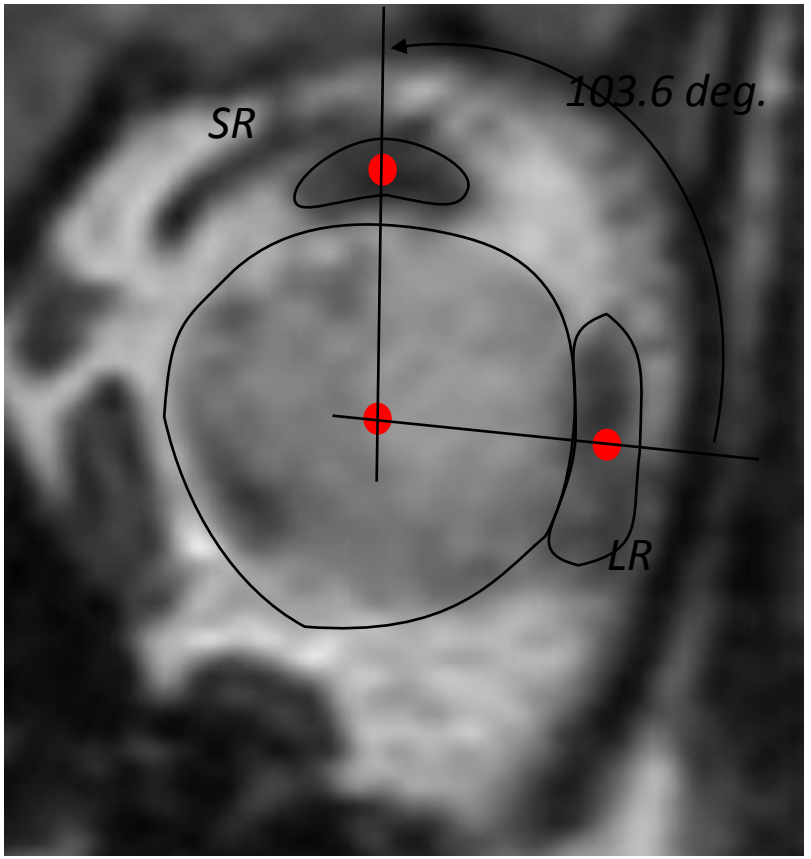
Coronal MRI Scans of Case 2



Measuring the Angle of Dislocation of the Eyeball



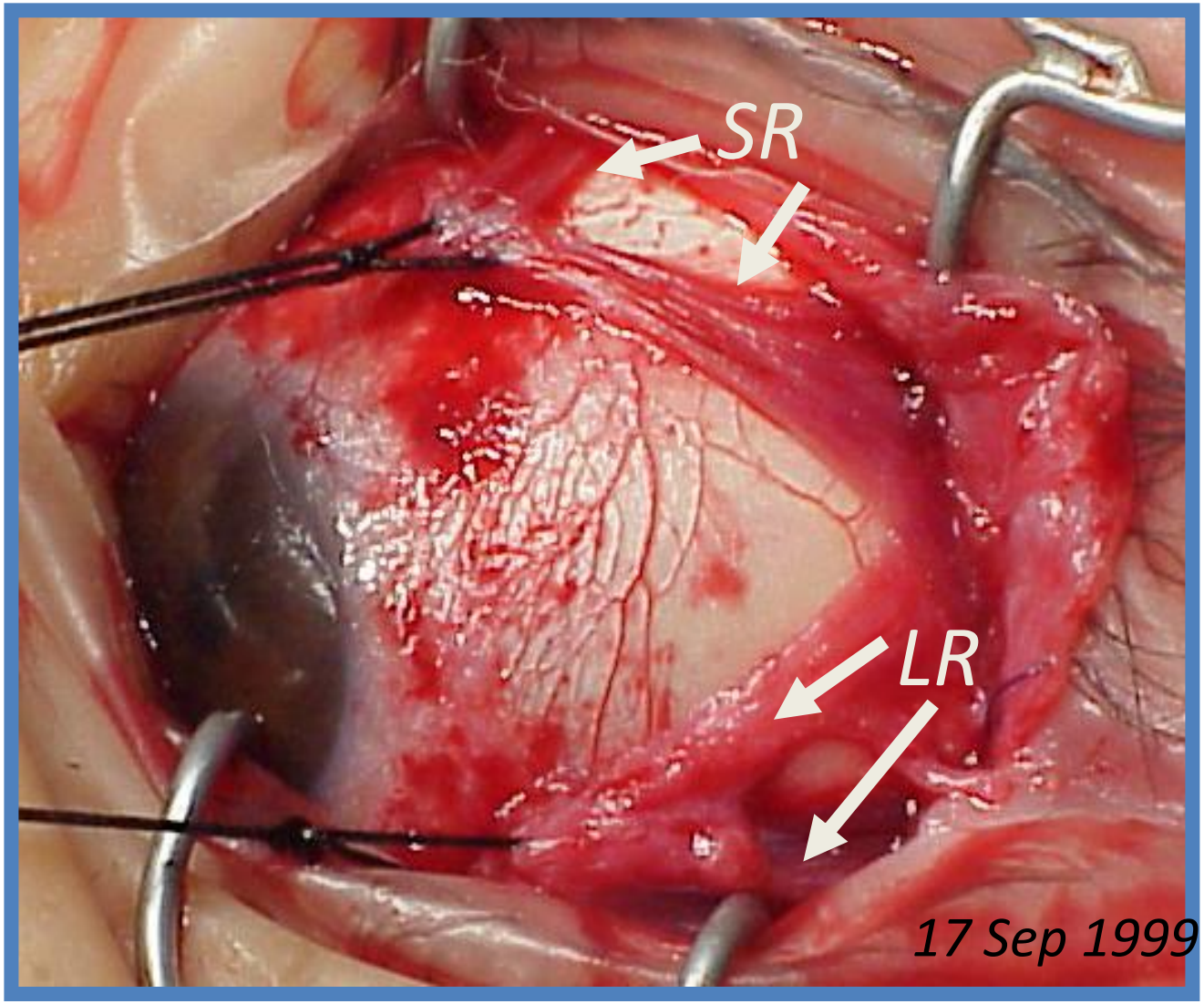
Preoperative



Postoperative

The center positions were measured with Scion Image® software.

Joining the SR and LR After Splitting (into halves)



Pathological associations

Thank you