Post Graduate Teaching

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Medical Retina Emergencies

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BMEC

Birmingham & Midland Eye Centre

Established 1823

GUIDELINES FOR THE MANAGEMENT OF COMMON MEDICAL RETINAL CONDITIONS IN EYE CASUALTY

DIABETIC RETINOPATHY

1. **Proliferative diabetic retinopathy**

If a patient with known PDR(PRP done in past) is seen in eye casualty with new onset of decreased vision due to vitreous haemorrhage then patient needs urgent PRP + anti-VEGF. An urgent laser slot had been created in each routine PM laser list for retinopexy/PRP. Please find out if urgent PRP can be arranged in this slot over the next few days from Medical retina booking team. If no slot available then please discuss with Medical retina Consultant/fellow. Also leave the notes in the medical retina tray in Eye Casualty INDICATING PATIENTS MEDICAL RETINA CONSULTANT IN CHARGE and the fact that patient NEEDS URGENT PRP+anti-VEGF. Urgent fax to LOCAL MEDICAL RETINA UNIT informing them about this episode and to arrange further follow up. Fax to be done by Eye Casualty admin staff.

If the vitreous haemorrhage is dense with poor fundal view and a retinal tear or detachment cannot be excluded then a B scan should be performed on the same day. Consider referral to VR service depending on the B-scan findings. If retina is flat and no urgent VR intervention required then forward notes to the consultant in charge or LOCAL EYE UNIT.

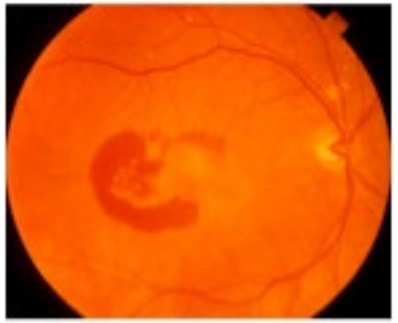
URGENT PRP MANAGEMENT (Same day PRP)

1. **New vessels on the iris** (Rubeosis iridis; NVI)

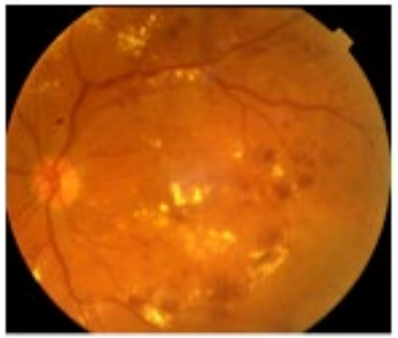
a) NVI with normal IOP - **same day** PRP (aim for 1500 spots) and inform Medical retina fellow /Consultant for urgent intravitreal Avastin (within a week) and further management.

Common Medical Retina Conditions in Eye Casualty

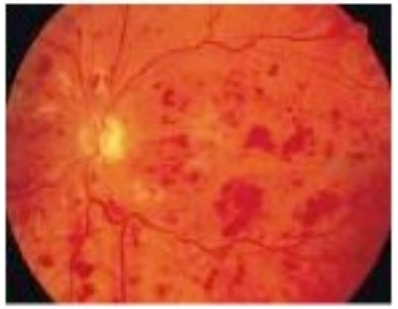
The big '3'



- AMD
  - Wet and Dry forms affect 25% of over 60s



- Diabetic Retinopathy
  - Overall affects 40% Diabetic patients

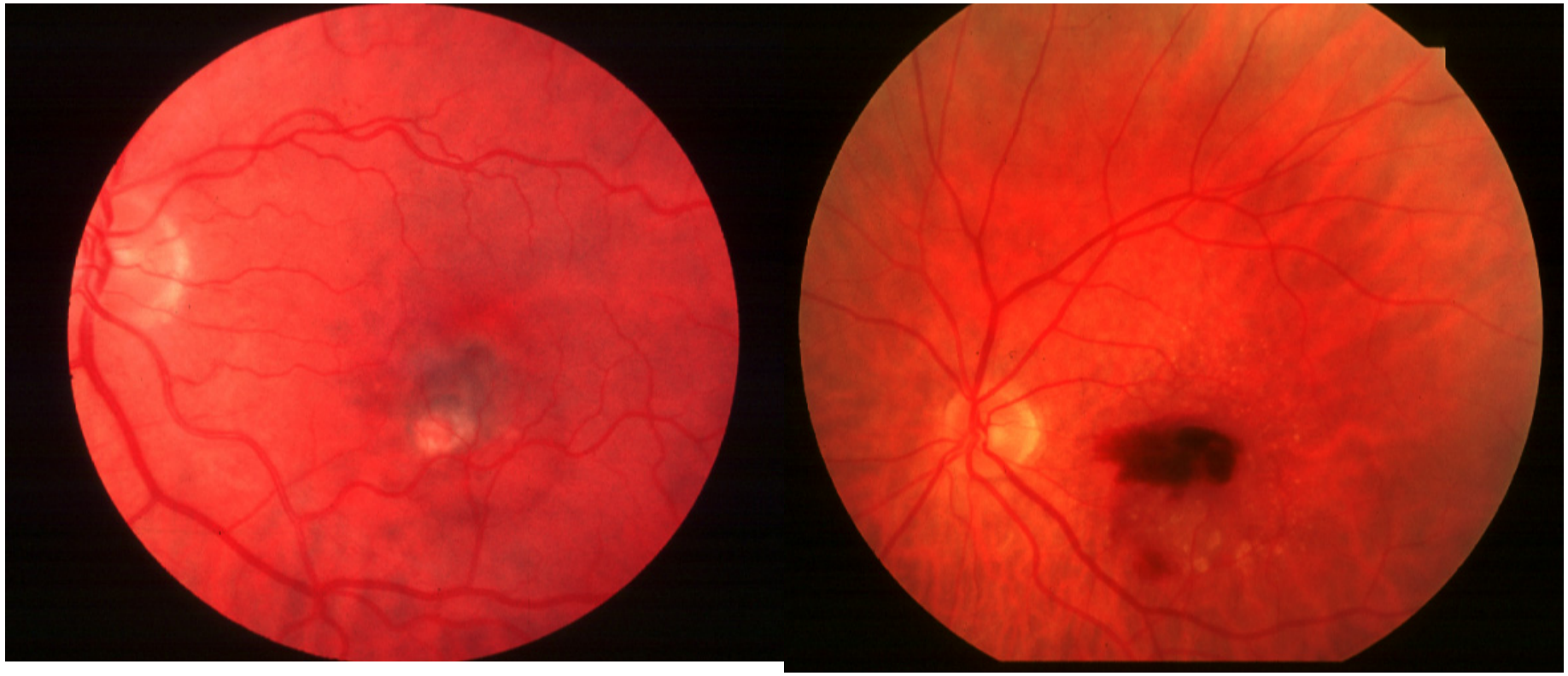


- Retinal Vein Occlusions
  - CRVO affects 0.5% of over 65s
  - BRVO 2-3 times higher

Choroidal neovascularization (CNV)

Neovascular AMD.

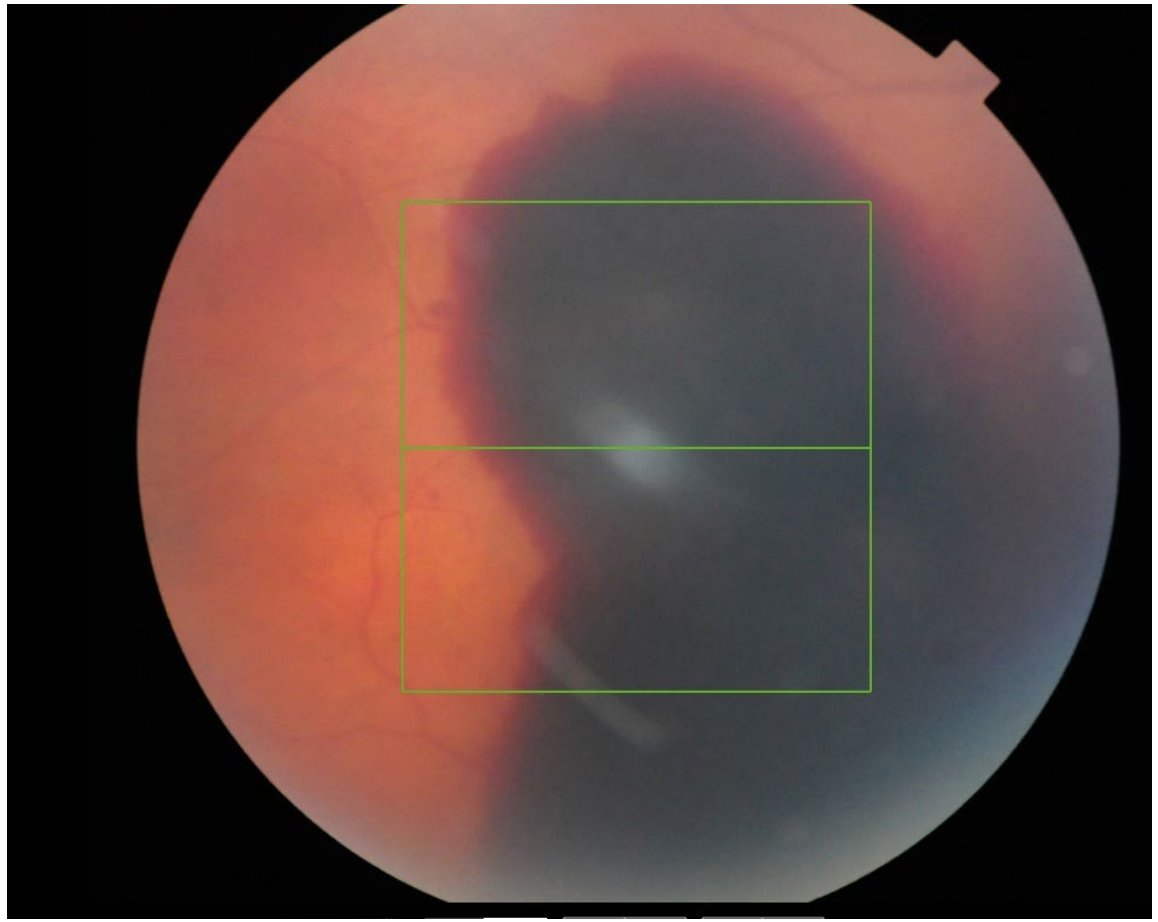
- Metamorphopsia is initial symptom



Pinkish-yellow subretinal lesion with fluid

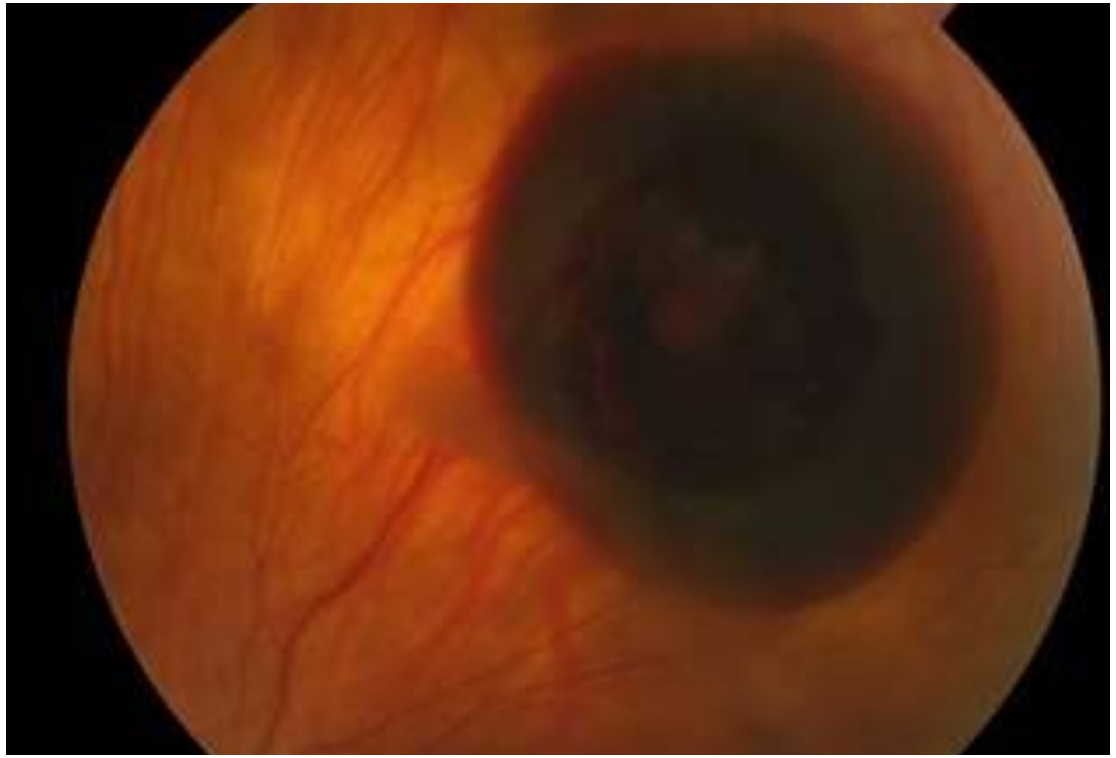
Subretinal blood or lipid

- Massive haemorrhage and suspected CNVM.
- VR opinion to consider any surgical intervention (tPA +gas)



Sub – retinal Heam
Bright red
Scalloped borders
Better prognosis with t-PA + gas

Sub-RPE Heam
Dard red – brown
Smooth & well demarcated borders
Poor prognosis



SUSPECTED CNV – Casualty management

- New referral from OPTICIAN - Send referral to Medical Retina Office for FAST TRACK MACULAR CLINIC appointment in 2 weeks

- Known case of CNVM from any aetiology with new onset distortion - Send notes to Consultant in charge or LOCAL UNIT for further review.

- ***Massive haemorrhage and suspected CNVM with 1 week history - VR opinion to consider any surgical intervention (tPA +gas)***

The big '3'

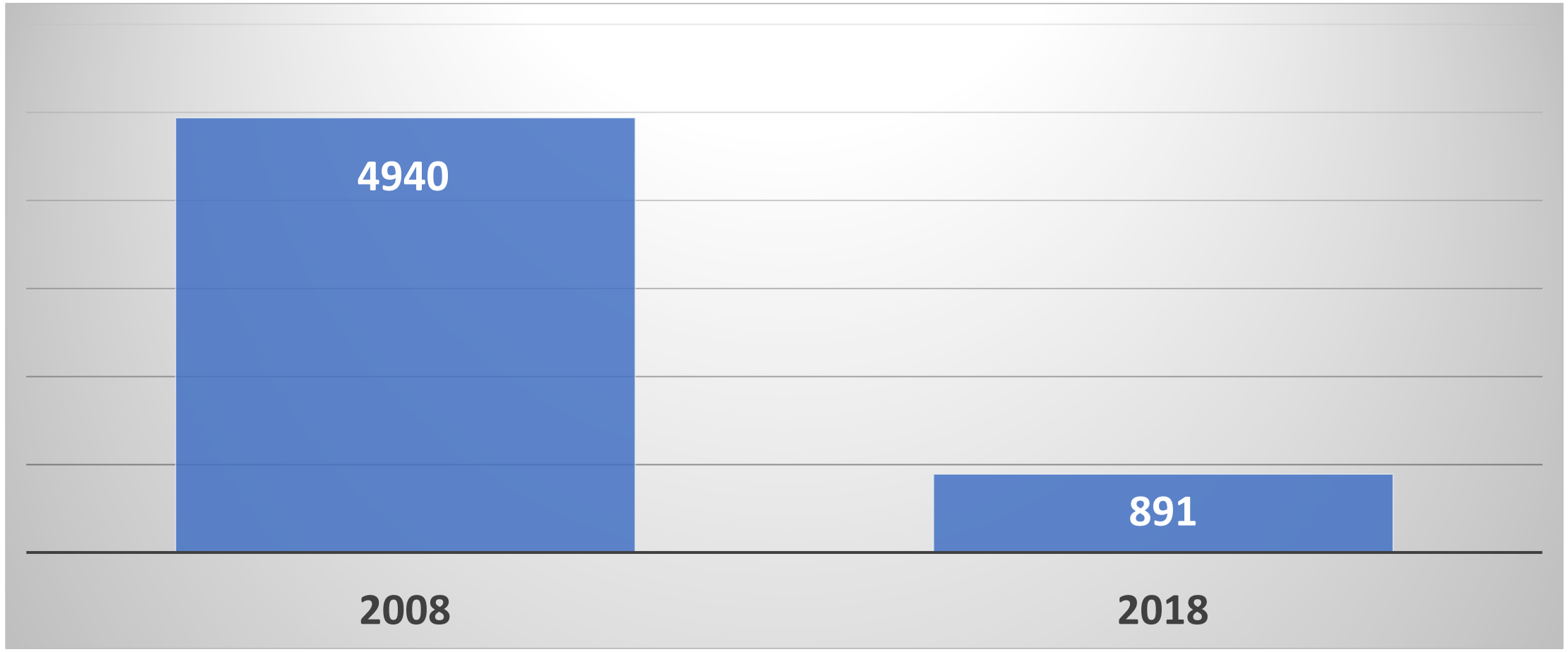
Diabetic retinopathy

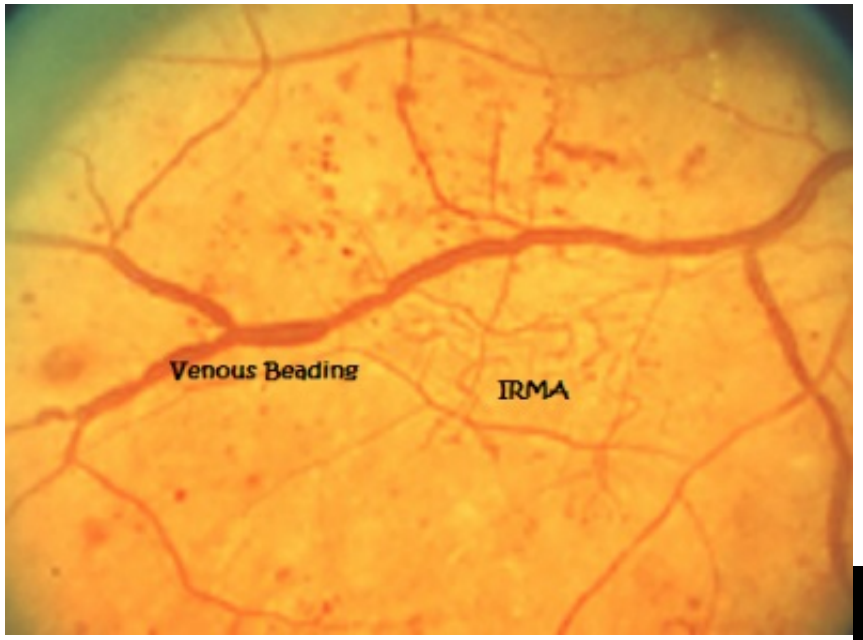
- Last 20 years DM: **1.4 → 3.5 million.**
- **1 in every 16** people having diabetes (diagnosed and undiagnosed).
- Diabetes prevalence in the UK is estimated to rise to 5 million by 2025.
- ***Sandwell and West Birmingham - Total Diabetics increased from 16,410 to 29,688 from 2008 to 2018 (an increase of 81%)***

Data from DESP

	Whole Screening Programme				Sandwell and West Birmingham CCG			
	2008	2012	2018	2019	2008	2012	2018	2019
Total Px screened	77283	101730	127859	128984	n/a	n/a	29688	29937
Referred to ophthalmology	12364	12788	3289	2641	n/a	n/a	1047	859
referred to surveilance	n/a	n/a	3583	3497	n/a	n/a	815	735
R0	49056	67967	97580	98092	n/a	n/a	22694	22828
R1	20748	27751	25324	26649	n/a	n/a	5765	6093
R2	586	935	811	685	n/a	n/a	187	158
R3(A & S)	4940	1249	891	597	n/a	n/a	245	168
of which R3A:	n/a	n/a	533	401	n/a	n/a	162	117
U	1953	3828	3206	2927	n/a	n/a	787	762

R3 (A&S) in Birmingham area in 2008 and 2018



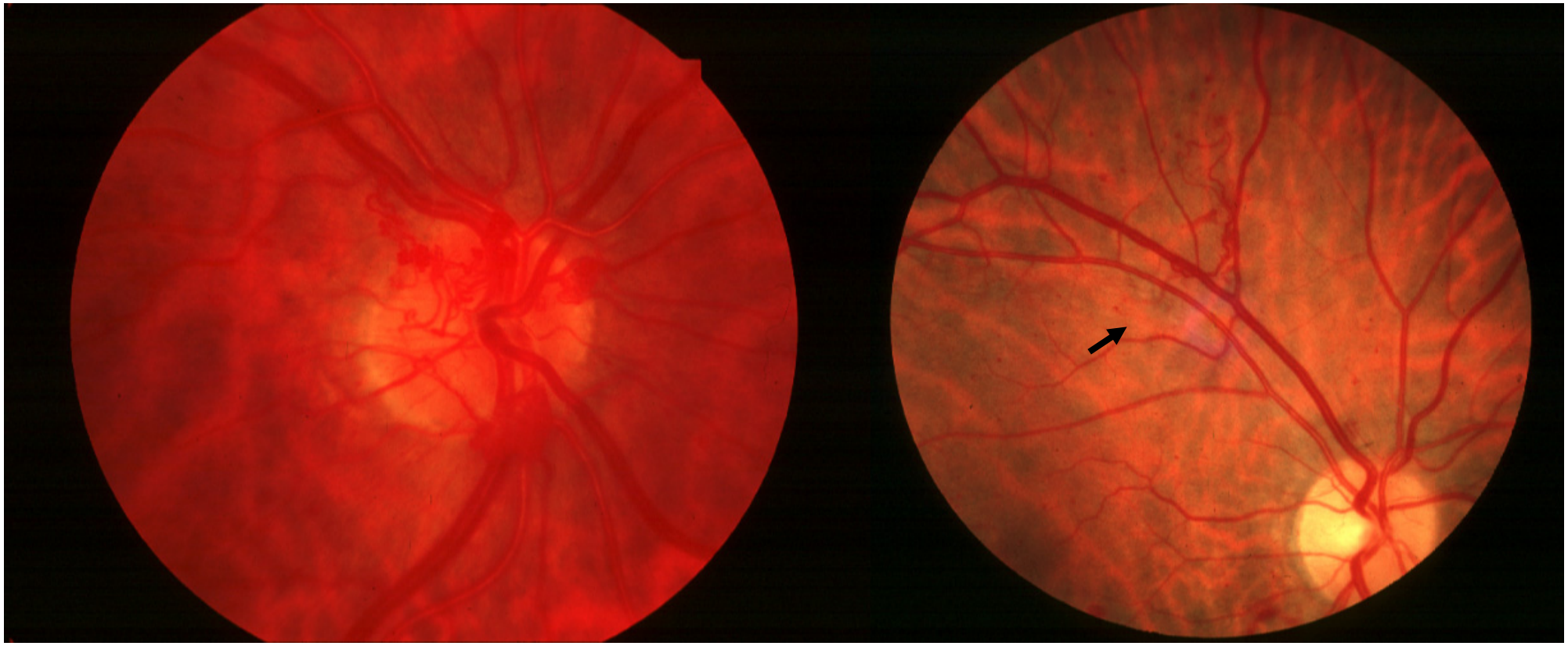

Venous Beading
IRMA

Proliferative diabetic retinopathy

- Affects 5-10% of diabetics
- Type 1 at increased risk (60% after 30 years)

Neovascularization

- Flat or elevated

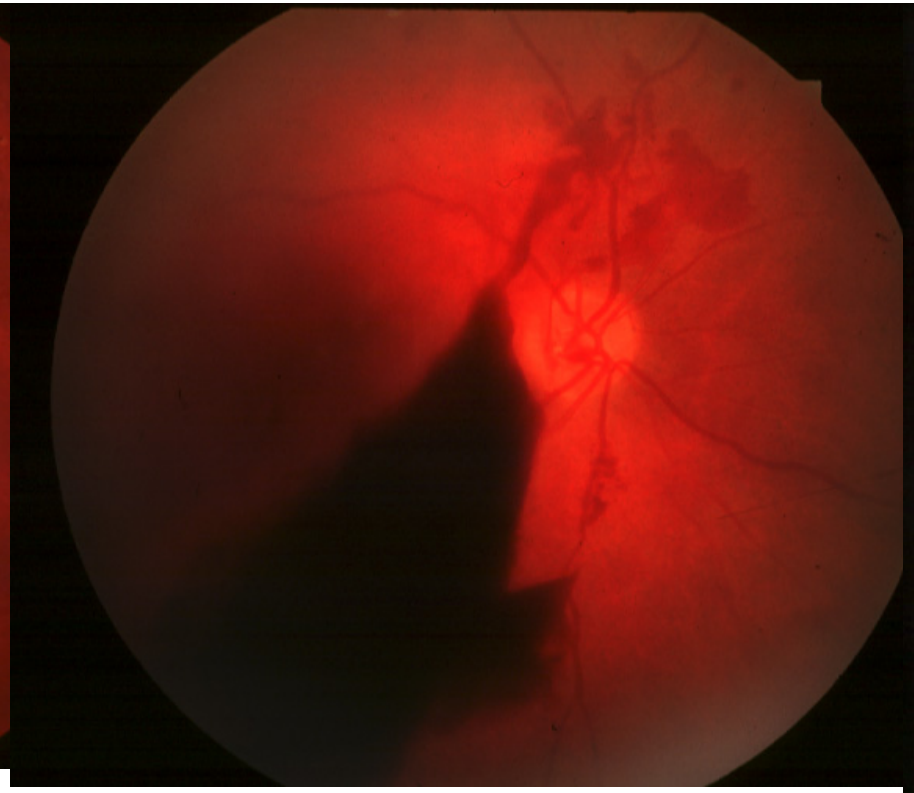


Neovascularization of disc = NVD

Neovascularization elsewhere = NVE

High risk Proliferative diabetic retinopathy

NVD > 1/3 disc in area



Less extensive NVD + haemorrhage

NVE > 1/2 disc in area + haemorrhage

Same day PRP

- **New vessels on the iris** (Rubeosis iridis) - Aim for 1500 spots
  Inform MR team for urgent IV anti-VEGF – Follow pathway

- **High-risk proliferative diabetic retinopathy** (NVD ≥ 1/3 disc area; NVD with VH; NVE ≥ ½ disc area with VH).

- **PDR in pregnancy**

- **Only eye**

General principles of PRP

- Aim for 1000 – 1500 burns /session
- Inferior first → temporal → superior → nasal
- At least 2DD clear area from disc nasally (Temporal visual field)
- High Risk PDR / NVI – Aim for 2500–5000 / 500µm burns over 2 sessions

	DRS / ETDRS	Current
Spot size	500 µm	200 – 300 µm
Power / Intensity	Grey/white	Gray – reduce power in periphery
Duration	100ms	10 – 50 ms
Spacing	0.5 – 1 burn apart	1-1.5 burn apart
Direct treatment to vessels	NVE	Avoid

Appendix 1: Table of commonly available laser contact lens magnifications and fields of view

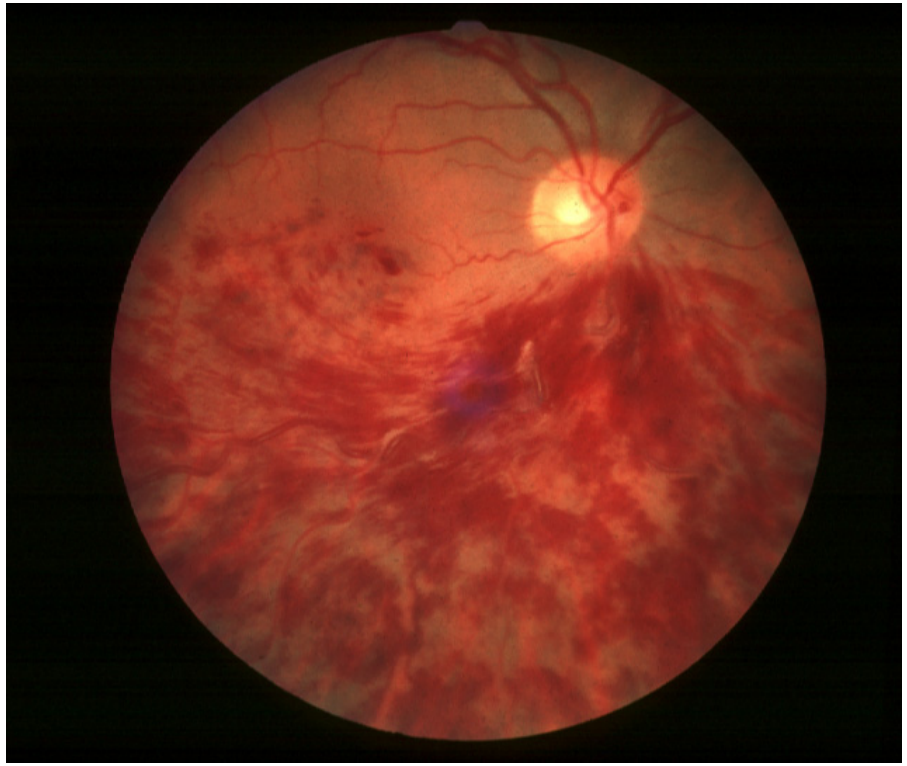
Name of lens	Field of view (in degrees)	Image magnification	Laser spot magnification
Area Centralis®	70-84	1.06	X0.94
Mainster focal/grid®	90-121	0.96	X1.05
TransEquator®	110-132	0.70	X1.44
Quadraspheric®	120-144	0.51	X1.97
Superquad 160®	160-165	0.50	X2
Mainster PRP 165®	165-180	0.51	X1.96

Most important bit

- Fluence = (power x time)/area
- Fluence required to produce a burn is less with shorter pulse duration (shorter time)
- Shorter pulse duration – less damage
- Less fluence – less damage to outer retina /RPE
- Minimal collateral damage

The big '3'

Retinal Vein Occlusions



Systemic:

Increasing age

Diabetes

Hypertension

Abnormalities of coagulation

Ocular:

Raised intraocular pressure

Periphlebitis

Signs of ischaemic CRVO

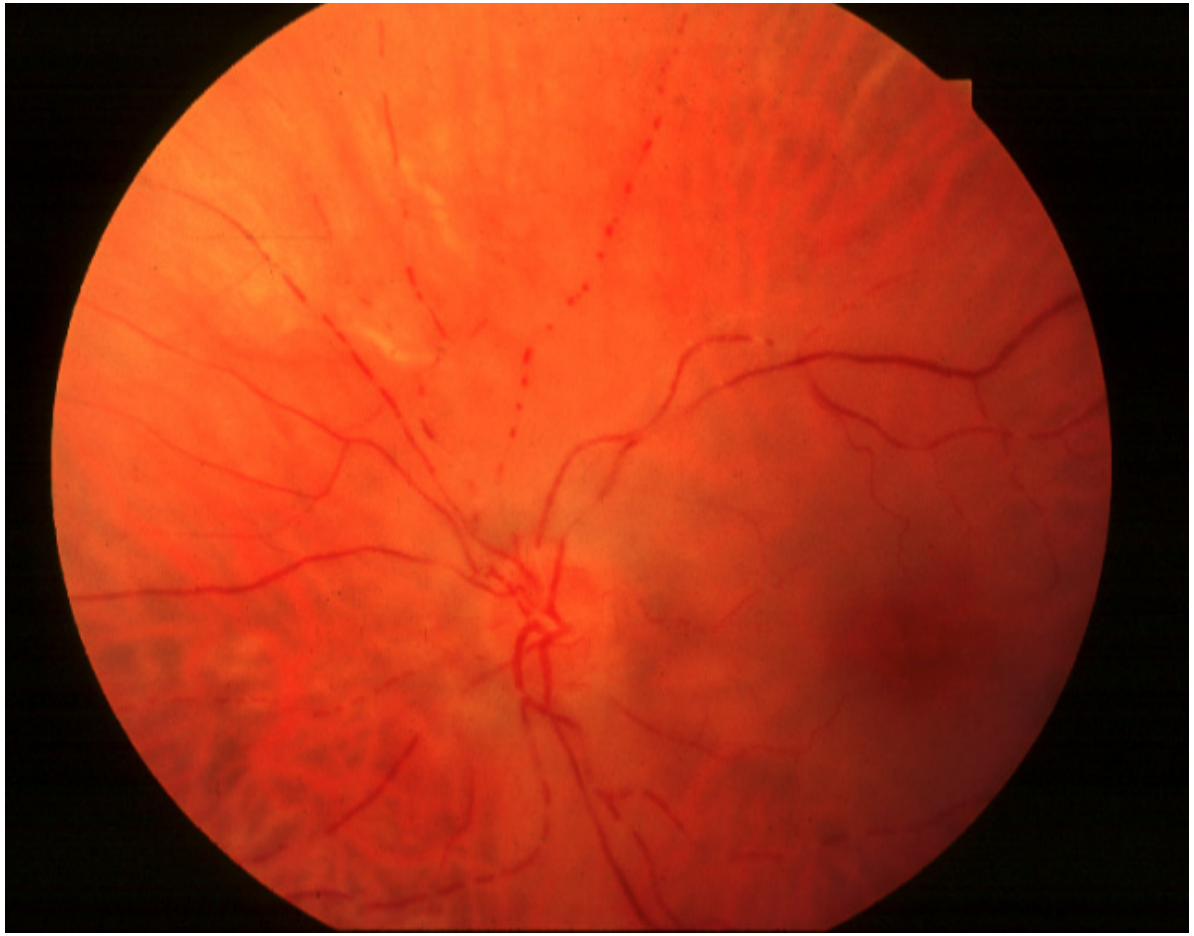
- VA < 6/60
- APD - marked
- Marked venous tortuosity and engorgement
- Extensive retinal haemorrhages
- Variable cotton wool spots
- Severe disc oedema
- Macular ischaemia
- Very poor prognosis
- Rubeosis irides in 50%

CENTRAL AND BRANCH RETINAL VEIN OCCLUSION

- Check BP and BM in Eye Casualty
- Clinically differentiate Ischaemic from Non-ischaemic CRVO
- Check for rubeosis

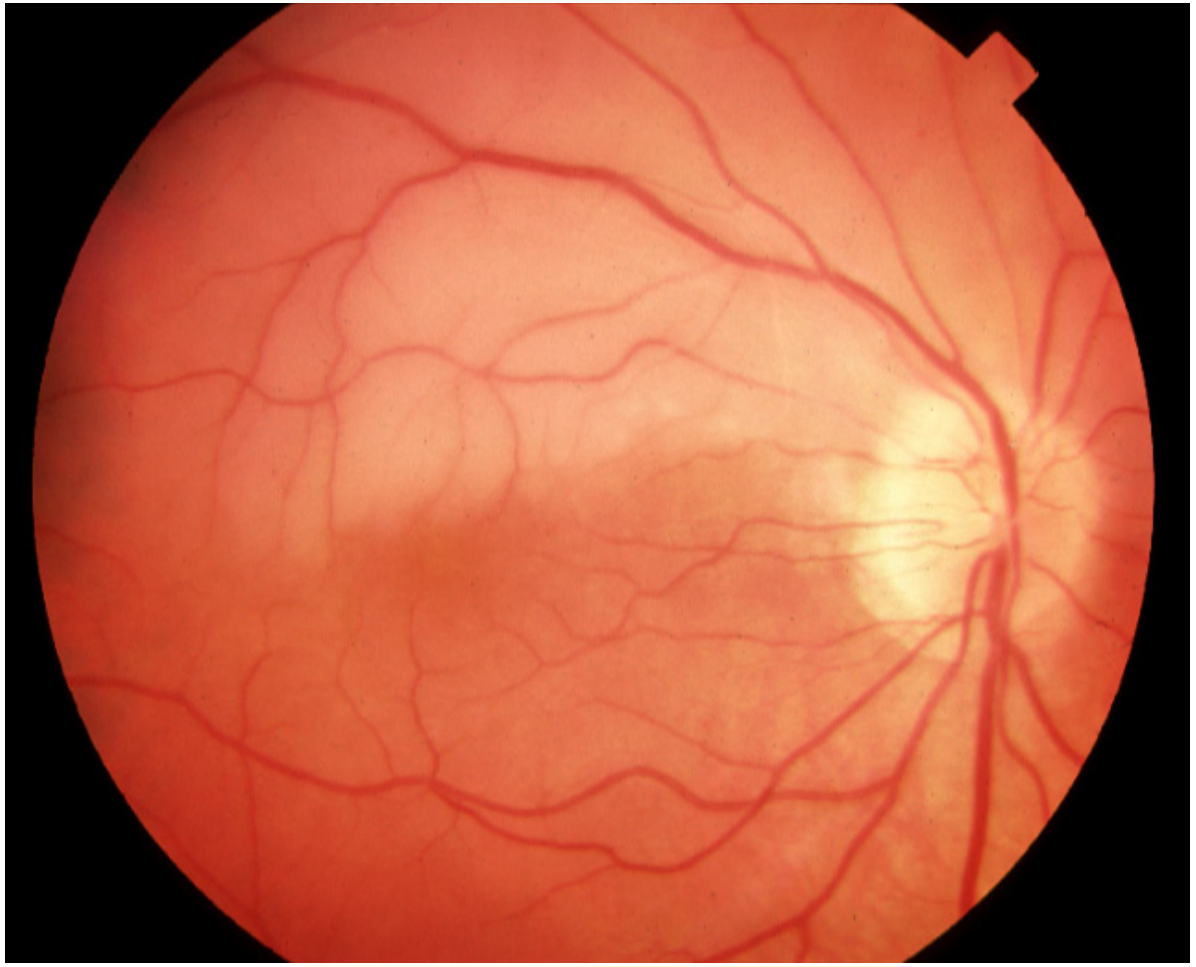
- New referral from OPTICIAN - Send referral to Medical Retina Office for FAST TRACK VEIN OCCLUSION CLINIC appointment.

Central retinal artery occlusion (CRAO)



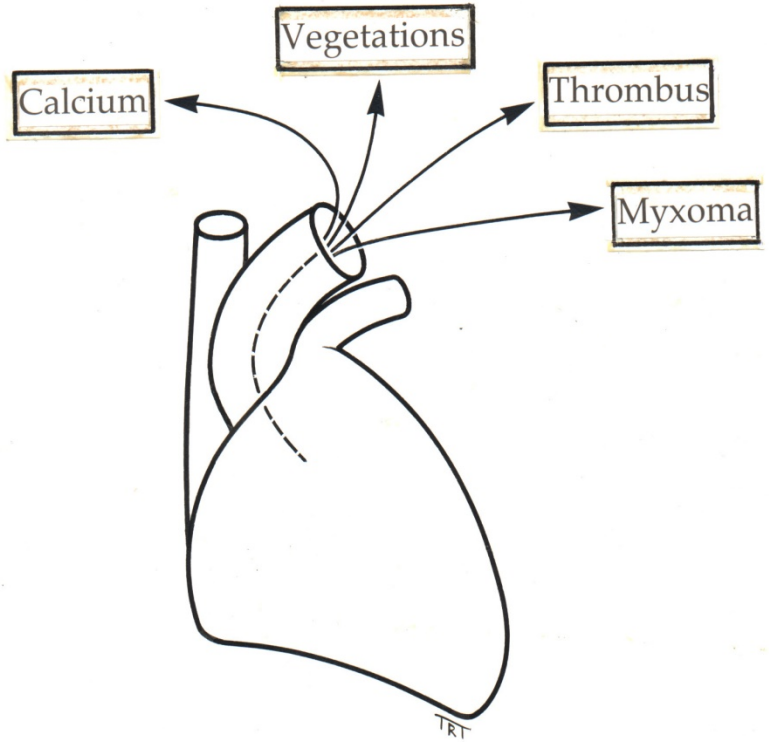
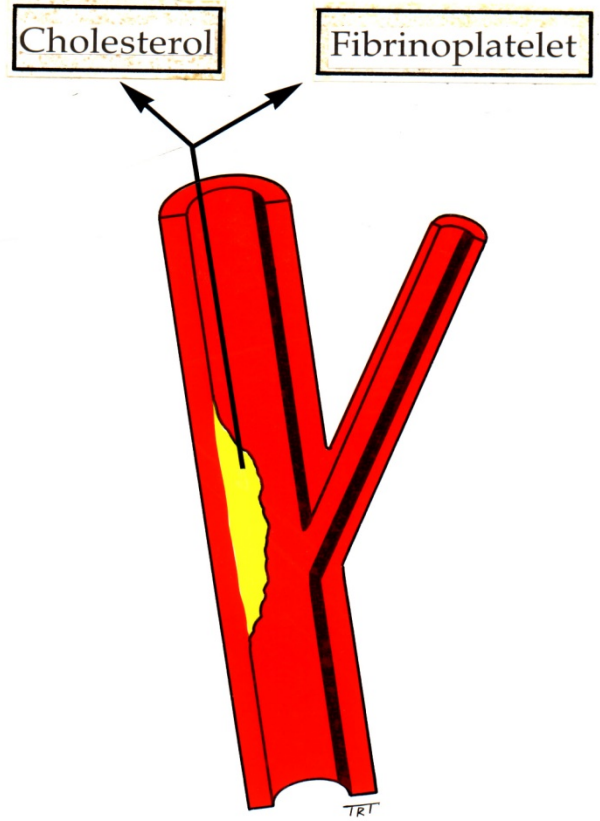
- VA < 6/60; APD – marked; Very poor prognosis
- Retinal whitening; ‘Cherry-red spot’ at macula
- Sludging and segmentation of blood column (cattle-trucking)

Branch retinal artery occlusion (BRAO)



- VA - variable
- APD - mild or absent
- Retina whitening
- Arteriolar narrowing

Types of emboli

Cardiac	Carotid
	
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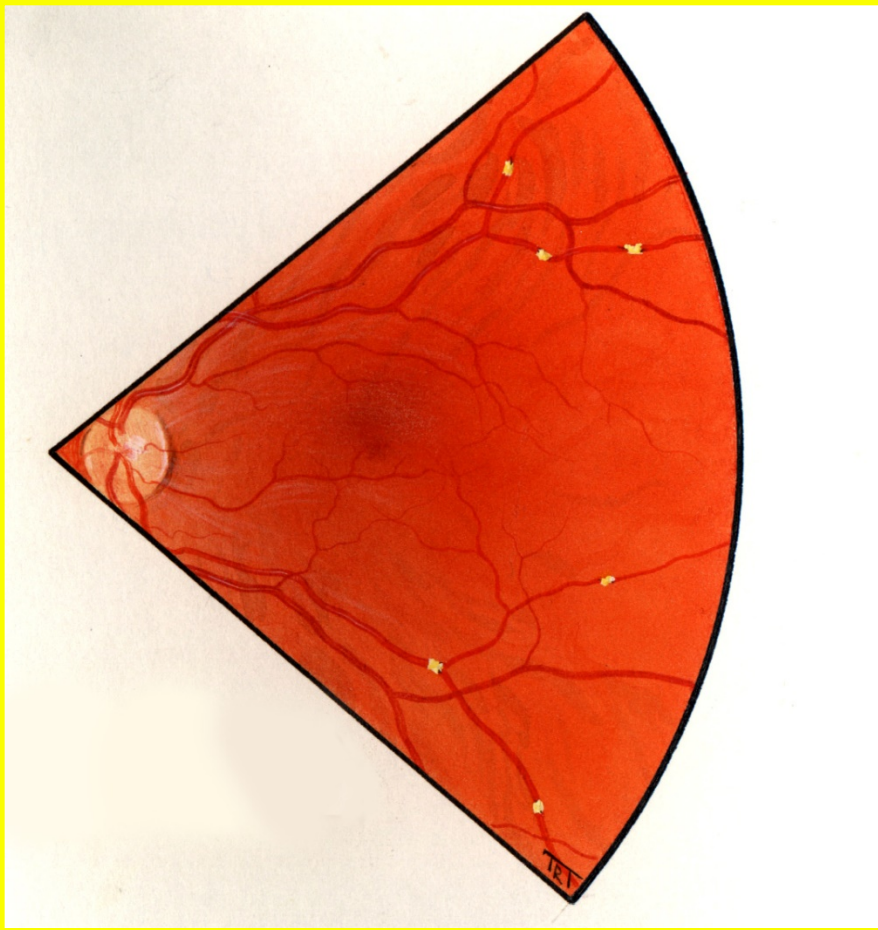
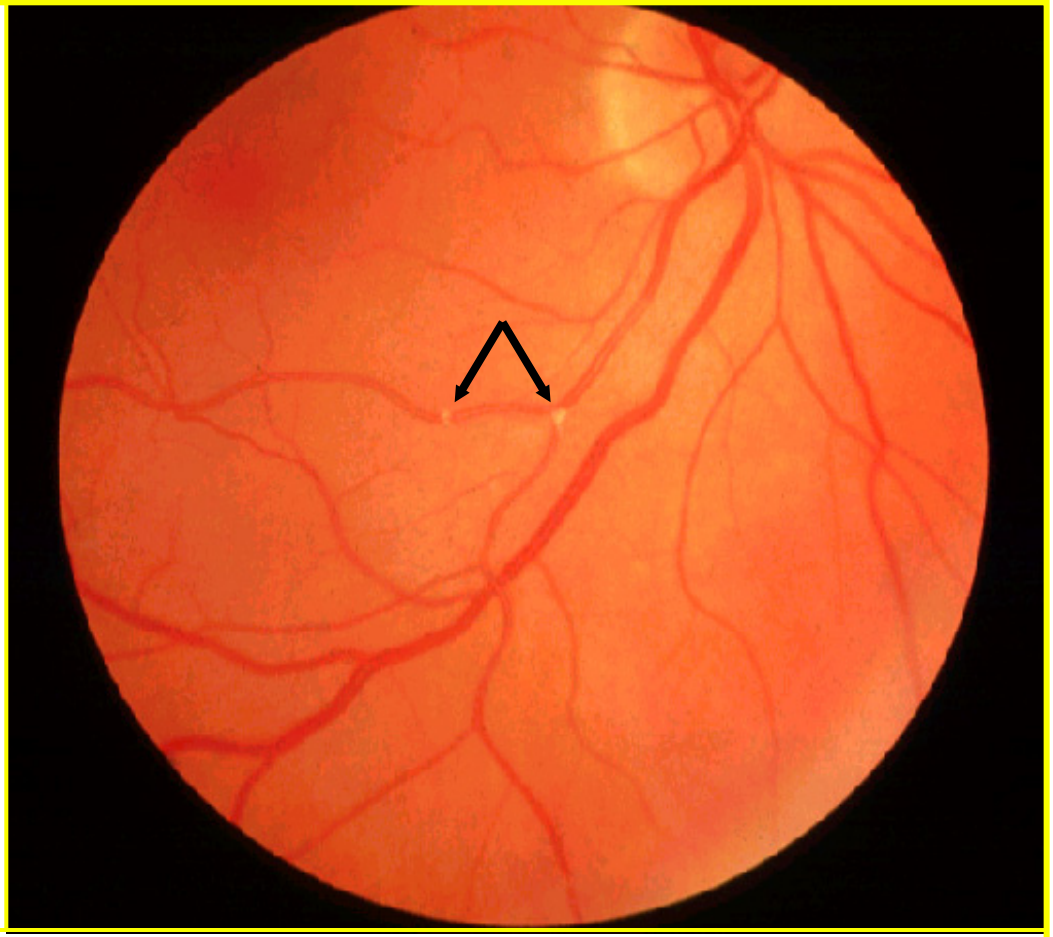
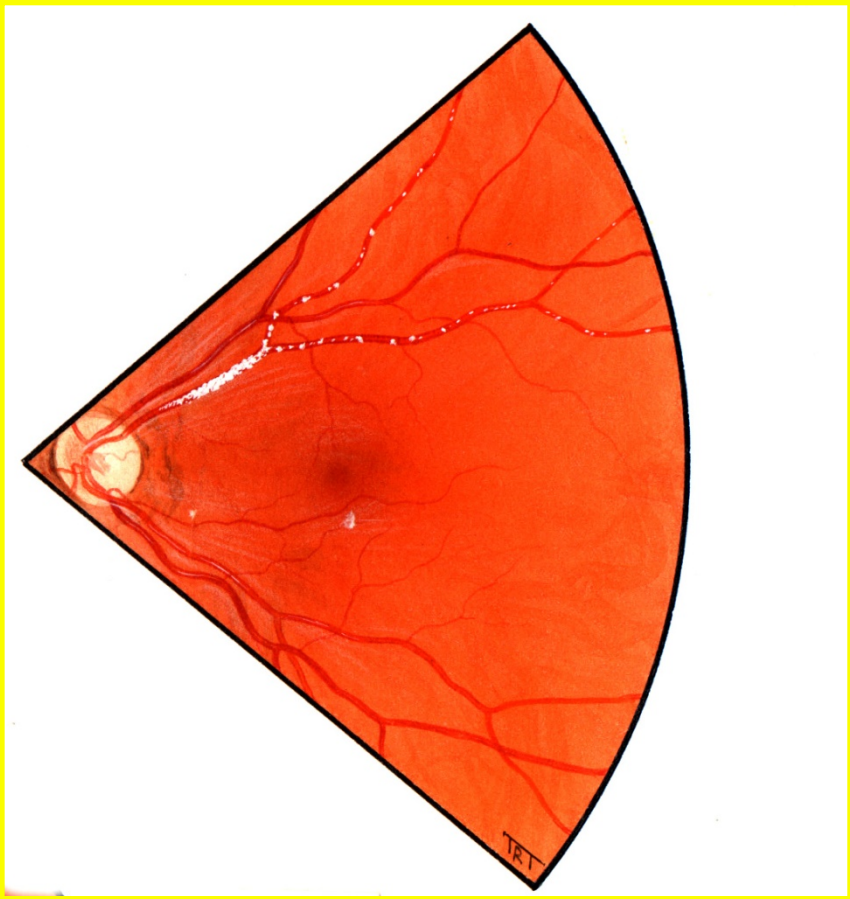
Cholesterol emboli (Hollenhorst plaques)

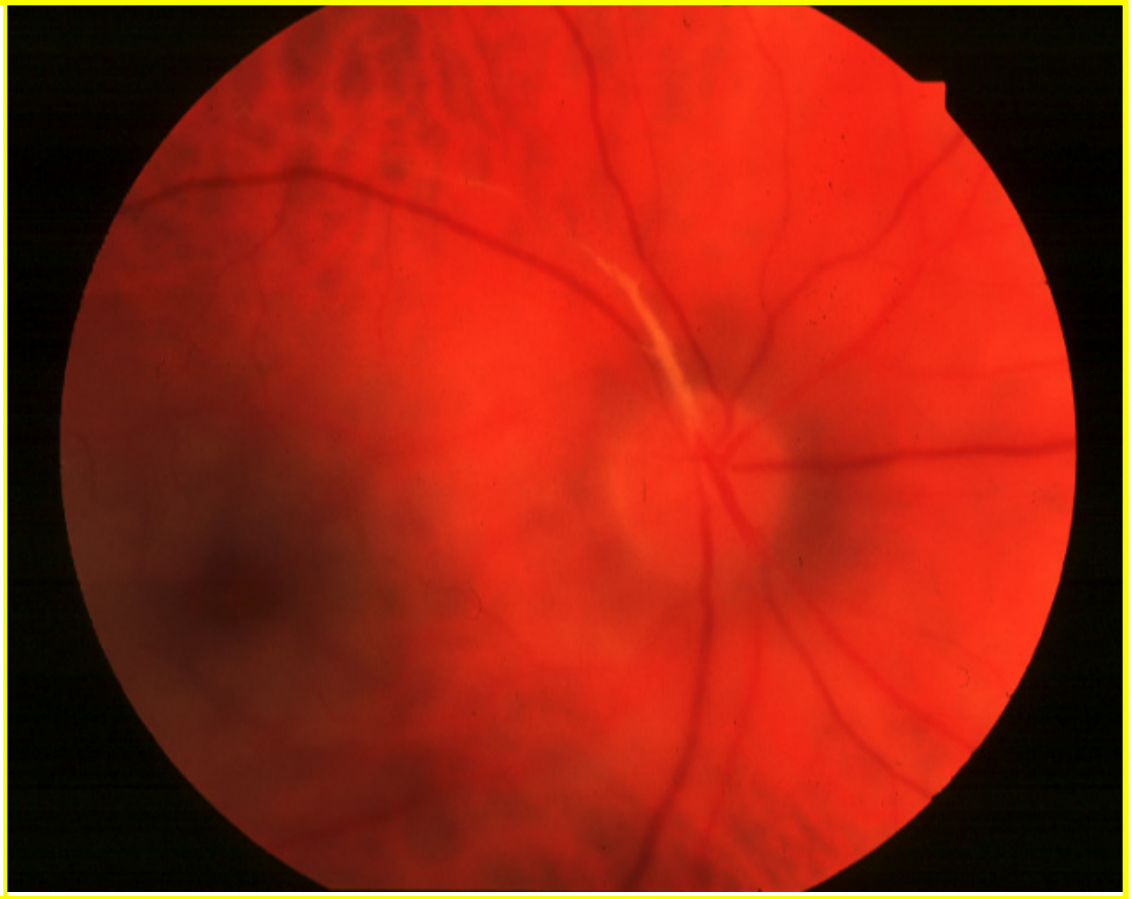




- Multiple, bright, refractile crystals
- Often located at arteriolar bifurcations
- Frequently asymptomatic

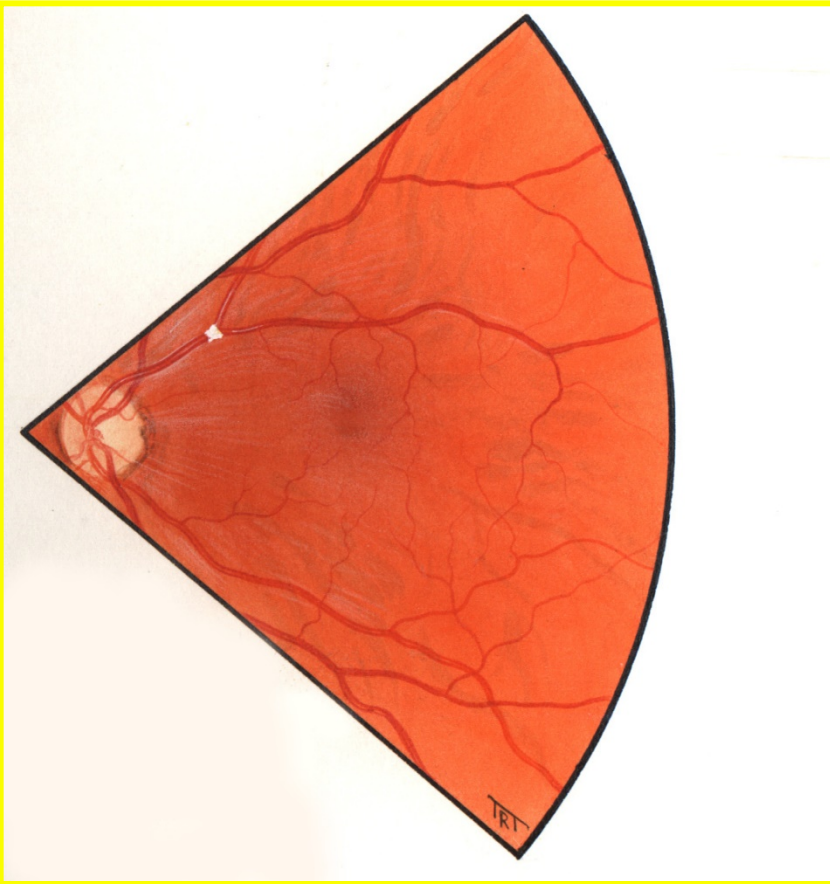
Fibrinoplatelet emboli

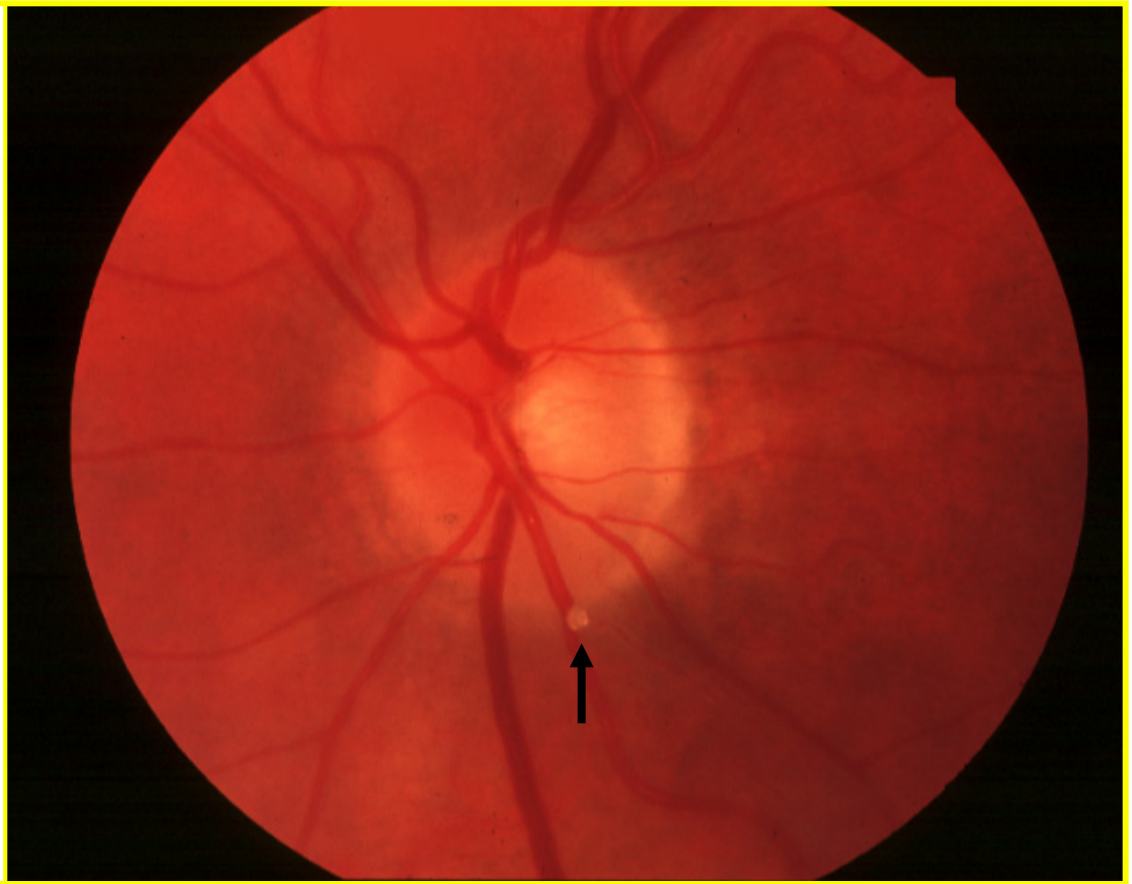




- Multiple, dull grey particles
- Occasionally fill entire lumen
- May cause amaurosis fugax and occasionally permanent obstruction

Calcific emboli





- Usually single, white and close to disc
- May cause permanent obstruction

Referral Pathway to TIA / Stroke Clinic

- Embolus
- CRAO
- VA / Field loss

-transient

-fluctuating

(no disc swelling)

Check BP

Complete TIA form

- email low risk
- Phone high risk

- scoring points ≥4

- high risks factors

- Aspirin 300mg

Refer Stroke patient to stroke team

Patient Details	Name:	DOB:	Age:
Address:			
Telephone:	RXK Number:	NHS Number:	

Referral made by:				GP details:
GP:	AE	BMEC	others	
Contact number of referring doctor (direct if possible)				

Timings (please complete in full)	
Date and time of index event	
Date and time of assessment	
Date and time of receipt of referral (leave blank)	

Clinical Features (tick as appropriate):	Right	Left		
Hemiparesis – arm and / or leg weakness			Dysphasia	
Hemisensory loss			Dysarthria	
Loss of vision one eye			True Vertigo	
Loss of visual field			Diplopia	
Inco-ordination / ataxia				

Brief History	BP:	BM:

Past Medical History – Tick all that apply					Recent investigations (if applicable)	
Atrial Fibrillation		Smoker	Ex		FBC	
Hypertension		PVD			UE	
Angina		DM			Cholesterol	
Previous MI		Hyperlipidaemia			ECG	
CABG		Heart failure				

Usual Medications:	Medications Started:

ABCD2 Score : TOTAL		HIGH RISK CLINICAL FEATURES
Age > 60 years	1	
Systolic BP > 140 and /or **diastolic BP** > 90	1	
Clinical Features		BP > 180/100
Unilateral weakness	2	Crescendo TIAs (>2 events in a week)
Speech disturbance without weakness	1	Patient on warfarin or newer anticoagulants
Other	0	Young patients (<50) with TIA symptoms and neck pain
Duration of Symptoms:		Patients with prosthetic valves
>60 minutes	2	Fluctuating symptoms
10-59 minutes	1	Current or known paroxysmal atrial fibrillation
<10 minutes	0	

SUSPECTED TIA PATHWAY

REMEMBER TO GIVE aspirin 300mg stat, if no contraindication AND **ADVISE NOT TO DRIVE**

SWBH TIA clinic Referral Form – email to swbh.tiaclinic@nhs.net

- **CORRECT CONTACT NUMBER**
- **INTERPRETER?**

TO SPEAK TO TIA CLINIC NURSE - 0121 507 3766

STROKE TEAM CONTACT DETAILS
Stroke Alert Nurse Specialist (24/7): 0779 224 8506
Stroke SpR: bleep 6020 (note out-of-hours bleep held by Sandwell SpR on call)

If **ABCD2 score 4 and above**
OR
High risk clinical features (*)

HIGH RISK

HIGH RISK FEATURES (*): patient to be referred as high risk whatever the ABCD2.

- Fluctuating symptoms
- Current or known paroxysmal atrial fibrillation
- BP > 180/100
- Crescendo TIAs (>2 events in a week)
- Patient on warfarin/rivaroxaban/dabigatran/apixaban/edoxaban
- Young patients with TIA and neck pain (<50)
- Patients with prosthetic valves

If in doubt OR if patient has ongoing symptoms or signs please discuss with stroke SpR or Consultant via SWBH switchboard

If you suspect that the patient **had a stroke, follow the stroke pathway**
Please REFER stroke patients **directly to the Stroke Team** for admission

SWBH TIA clinic Referral Form – **email to swbh.tiaclinic@nhs.net**

The Medical Retina Emergency Unmissables

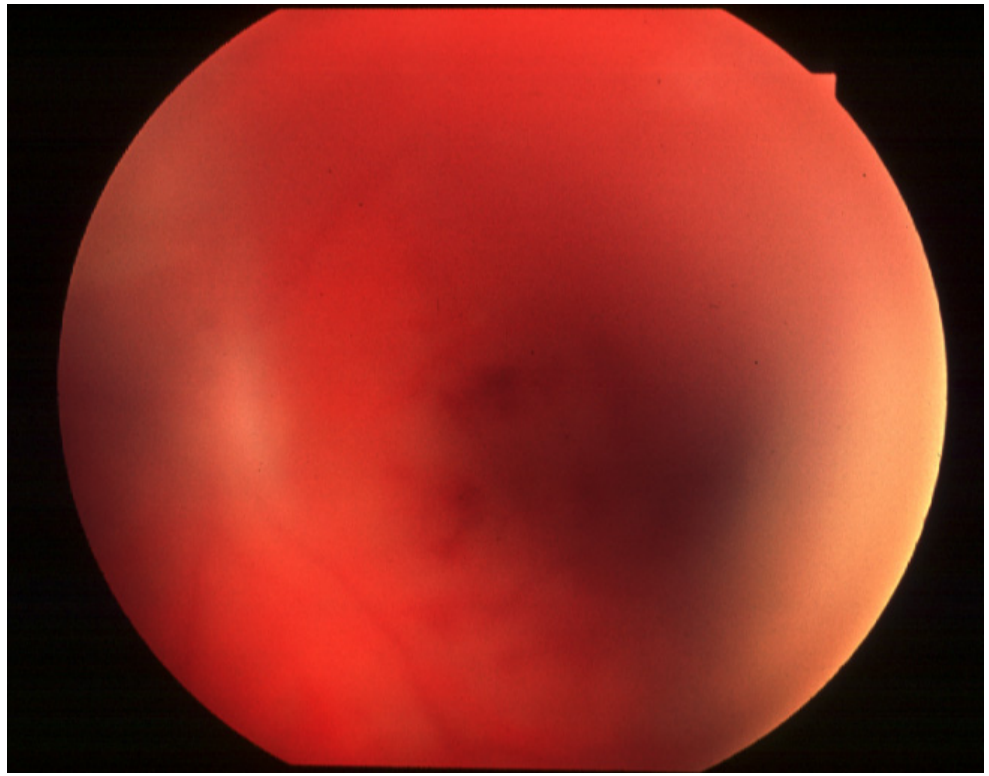
- Untreated Malignant Hypertension
- Post-operative Endophthalmitis
- Rubeosis Iridis

Untreated MHT:
88% mortality in 2 yrs
Treated MHT:
80% survival in 5 yrs

Check BOTH fundi…
Check BP……..

Same day send patient to main casualty, not to GP

Endophthalmitis



- Pain and marked visual loss
- Corneal haze, fibrinous exudate and hypopyon

- Absent or poor red reflex
- Inability to visualize fundus with indirect ophthalmoscope

Endophthalmitis :
86% treated achieved 6/9 vision

Protocol in casualty

Casualty dos:

- Diagnosis +/- ultrasound
- Intravitreal / AC taps / send off cultures
- Intravitreal antibiotics
- Inform / email consultant (if known, especially post- glaucoma procedure)

Admission:

- Start oral steroid and antibiotics
- Treat IOP
- Prescribe list of eyedrops etc
- Monitor BP, BM, FBC/UEs

BMEC treatment protocol for Exogenous Endophthalmitis

In casualty: Ultrasound to exclude RD if no fundus view
Bloods: FBC, UEs, LFT, HbA1c, glucose
Vitreous tap + AC sample + intravitreal injections

1st intravitreal injections immediate (after 1st vitreous tap)
Vancomycin (1mg/0.1ml) – ready made
Ceftazidime (2mg/0.1ml) – reconstitute as per instruction
Dexamethasone (0.4mg/0.1ml) – ready made
***for history of severe penicillin allergy of anaphylactic reaction – use amikacin 400micrg/0.1ml (ready made) instead of ceftazidime*
***only avoid initial steroid injection if patient has history of immunocompromised / drug addiction*

2nd intravitreal injections 48 hours later (2nd vitreous tap – no need to send to lab):
Vancomycin (1mg/0.1ml)
Ceftazidime (2mg/0.1ml)
Dexamethasone (0.4mg/0.1ml) *- avoid if fungal culture positive*

Microbiology: vitreous tap (minimal 0.1 - 0.3ml) + AC sample
culture / sensitivity (send to local lab),
PCR for culture of bacterial, fungal (send to Coventry lab)
Check culture / sensitivity DAILY - by oncall team / consultant's team, liase with microbiologist in positive rare culture / fungal etc.

Compulsory Admission
- MUST inform consultant-oncall
(consultant must ensure admitting trainee is aware of protocol)
- urgent contact glaucoma team if endophthalmitis related to "glaucoma-tube surgery"
- email original patient's consultant if BMEC patient identified

Prescriptions for ward admission:
Topical (day1): G Predforte 2 hourly during day only, qid after discharge
G Ofloxacin 2 hourly during day only, qid after discharge
G Atropine 1% od, stop after discharge
Anti-glaucoma eyedrops prescribed accordingly
Oral (after culture result): Prednisolone 1mg / kg body weight (+ranitidine / calcichew)
- reduce 10mg/week after ward-discharge, stop after 6-8 weeks.
Subconjunctival: Dexamethasone *(4mg/ml) – optional as per consultant's decision*

PPV (VR opinion): after 3 days - if status worsening or persistent Perception of Light vision.

Acute Post –op bacterial endophthalmitis

Incidence - about 1:1,000

Common causative organisms

- *Staph. Epidermidis;aureus*
- *Pseudomonas* sp.

Source of infection

Patient's own external bacterial flora is most frequent culprit

SUMMARY

- FAMILIARISE YOURSELF WITH THE LOCAL GUIDELINES FOR VITREOUS TAP AND INTRAVITREAL ANTIBIOTICS
- VITREOUS TAP AND INTRAVITREAL INJECTIONS AT BMEC ARE DONE IN A CLEAN ROOM
- USE A 23G BLUE NEEDLE AND 3 ML SYRINGE TO PERFORM VITREOUS TAP – IF DRY TAP, REPLACE 3ML SYRIN WITH A 5ML SYRINGLE
- AFTER VITREOUS TAP, INJECT INTRAVITREAL ANTIBIOTICS
- PERFORM AC TAP WITH A 1 ML SYRINGE WITH PLUNGER REMOVED
- REPLACE NEEDLES IN SYRINGES WITH A LUER LOCK CAP
- SEND SAMPLES TO MICROBIOLOGY DEPARTMENT FOR CULTURE SENSITIVITY + / PCR TEST

PATIENTS WEARING FACE MASKS DURING INTRAVITREAL INJECTIONS MAY BE AT A HIGHER RISK OF ENDOPHTHALMITIS

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Purpose: To investigate the safety of face masks worn by patients during intravitreal injections.

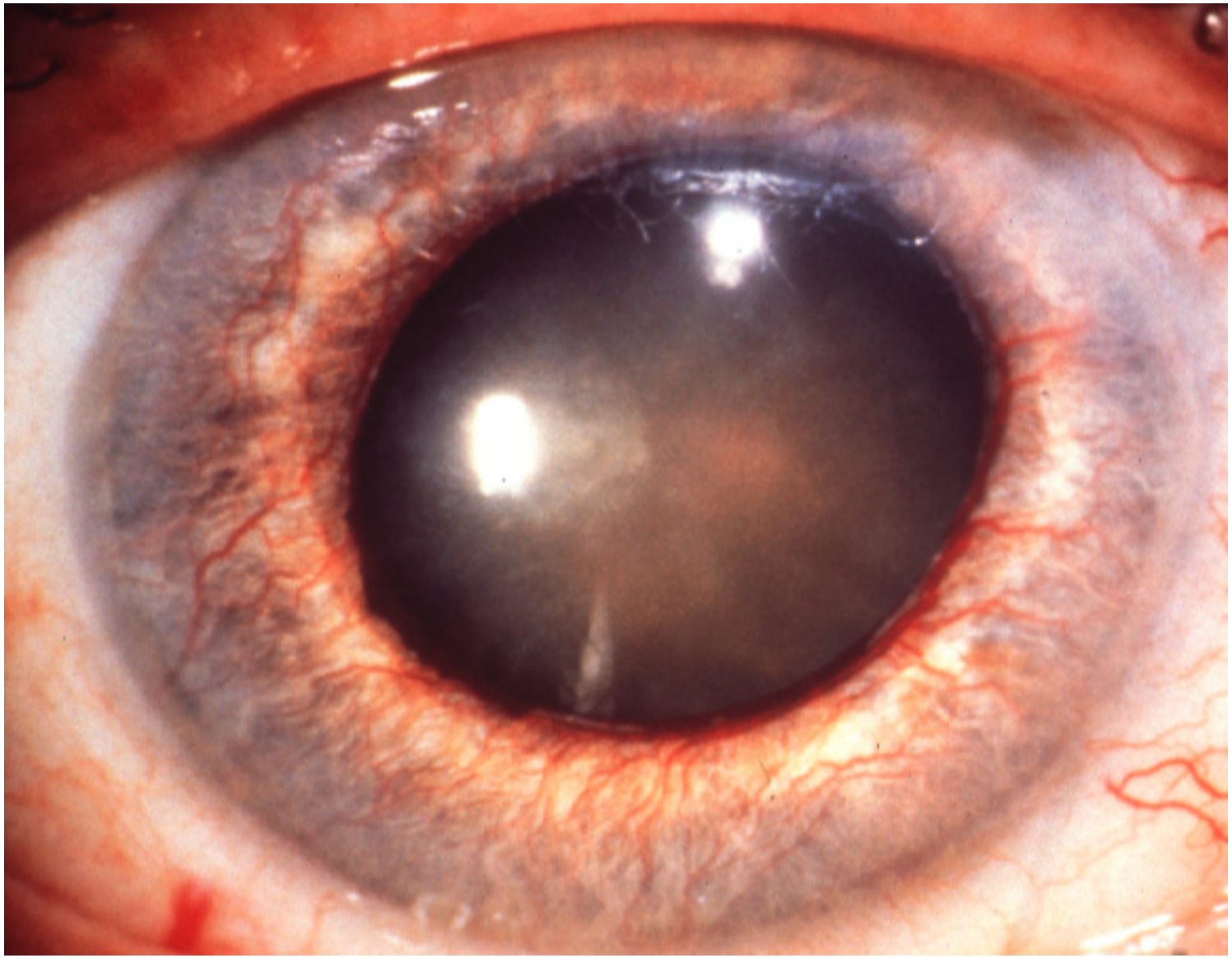
Methods: A prospective, qualitative, interventional study performed in a tertiary university hospital. Healthy volunteers were asked to wear three different professional surgical face masks while air leaks around the eyes were monitored. Three types of masks were investigated as follows: 1) surgical face mask with four tying strips, 2) surgical face mask with elastic ear loops and 3) 2200 N95 tuberculosis particulate face mask. For each session the periocular area was inspected for air leak during normal respiration, speech, and deep respiration. Detection of air leak was performed using the following two professional thermal cameras: FLIR A310—thermal camera and EyeCGas 2.0—super sensitive infrared camera used for detection of minute fugitive emissions of industrial gases.

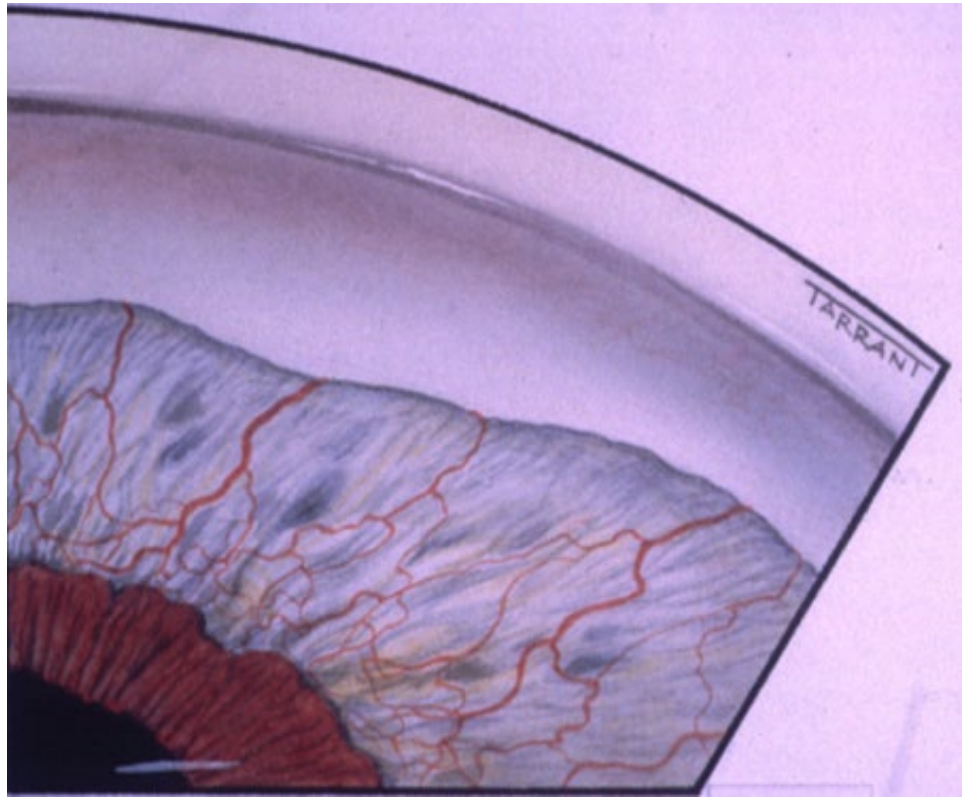
Results: Ten healthy volunteers were enrolled in this study. The experiment was repeated 45 times for each camera; 3 times for each of 3 mask types, on 5 volunteers, for a total of 90 trials. Air jets were detected originating from the superior edges of the masks radiating toward the eyes in 81% (73/90) of cases in total; 71% (32/45) with the FLIR camera and 91% (41/45) with the OPGAL camera. Air leaks were detected with all investigated mask types.

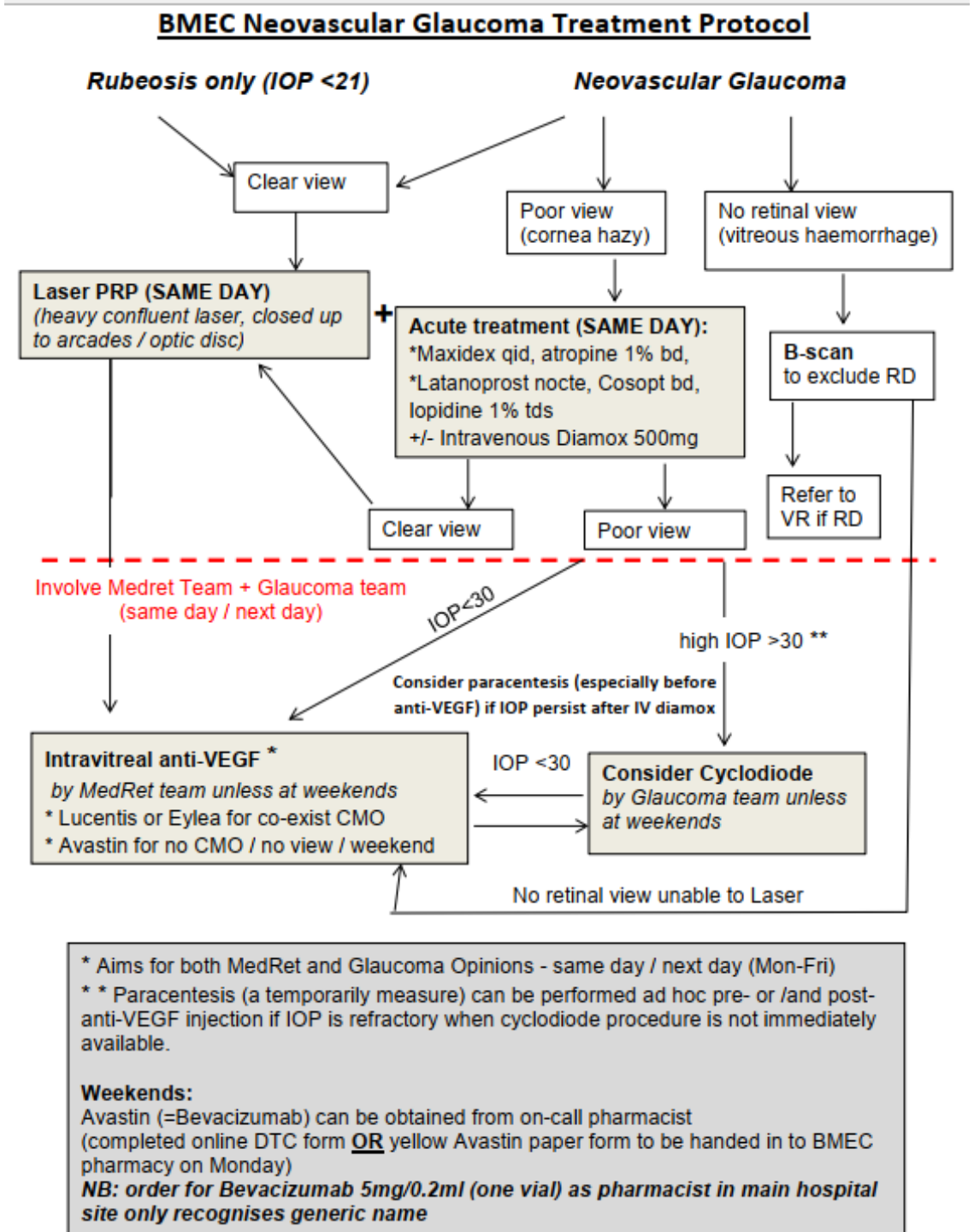
Conclusion: Patients wearing face masks during intravitreal injections may be at a higher risk of endophthalmitis. Until further data are available, we recommend verifying proper face mask fitting and either taping the upper edges of the face masks with a medical adhesive tape or using an adhesive surgical drape around the injected eye.

RETINA 40:1651–1656, 2020

Rubeosis Iridis







Anti-VEGF reverses Rubeosis

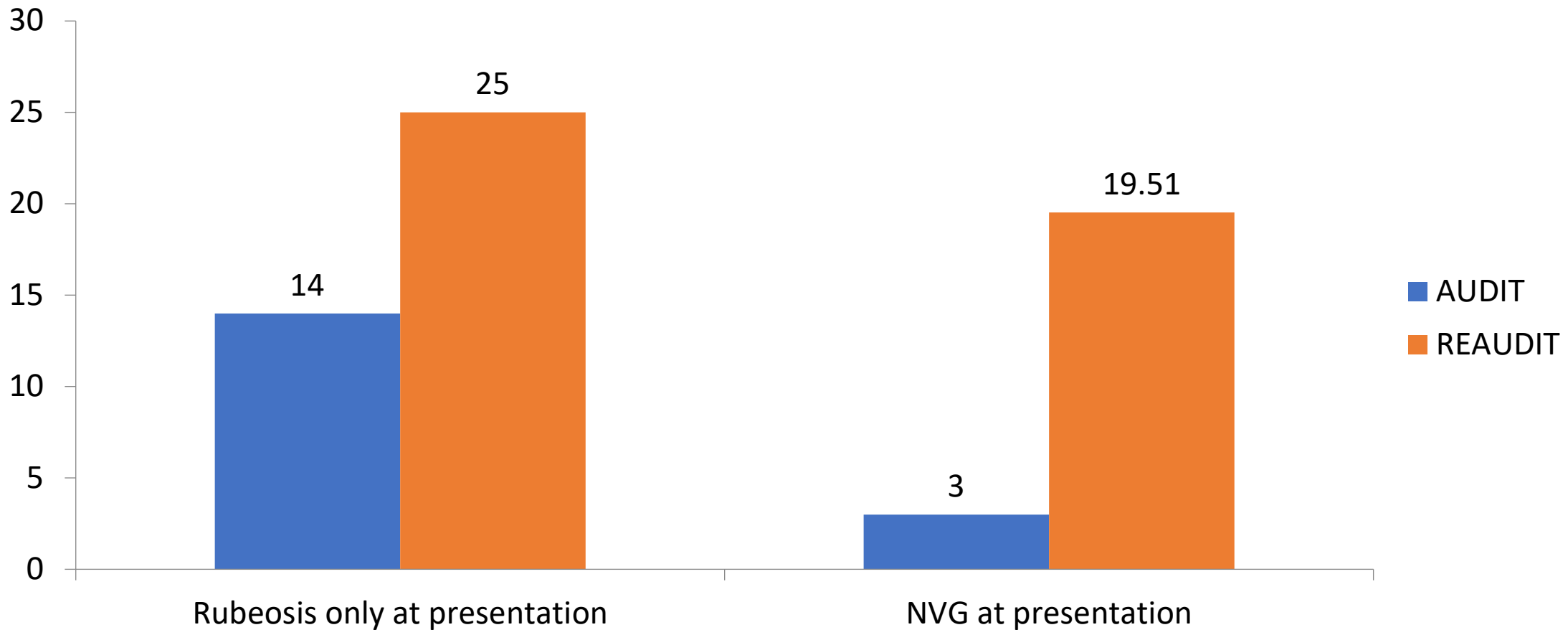
Re-audit on treatment outcomes in Eyes with Initial Rubeosis only and Eyes with Neovascular Glaucoma

Rinoza Bafiq, Randhir Chavan,
Mrs Peck-Lin Lip

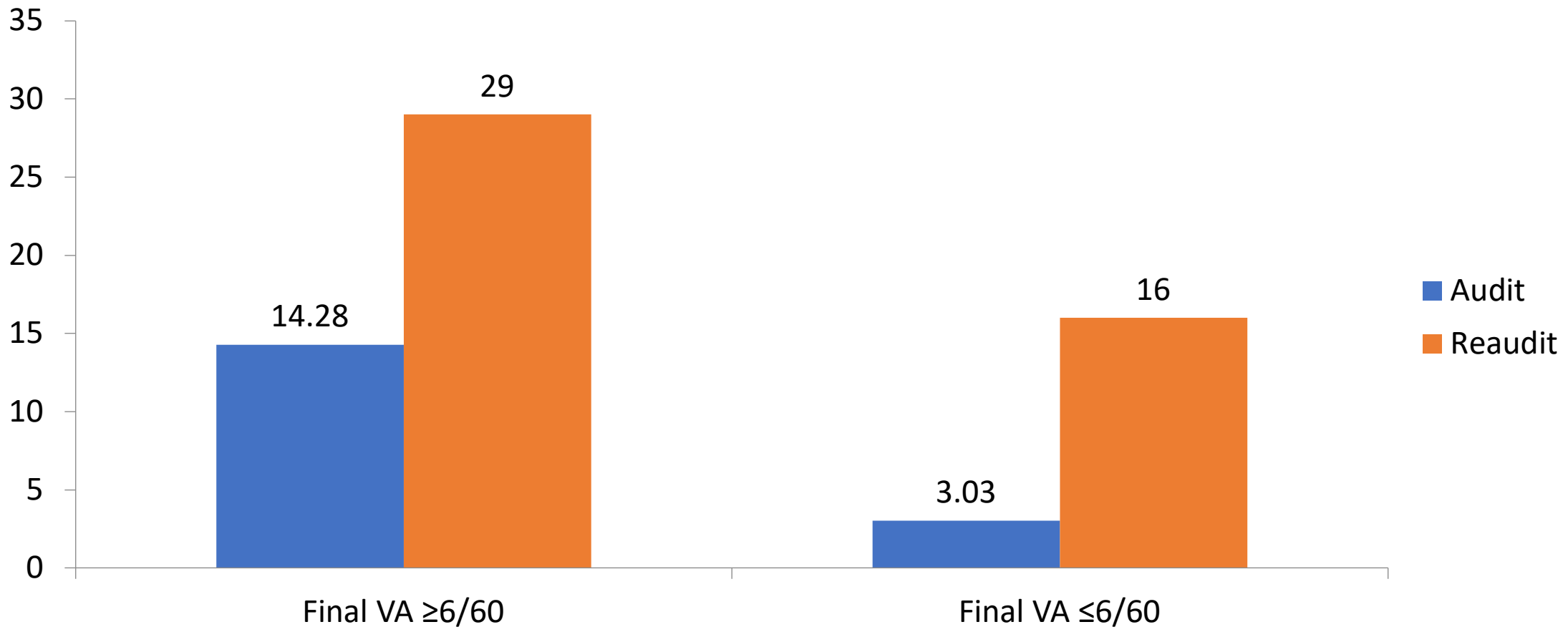
Important points from NVI Re-audit

- **55% (27/49 eyes) had vision worse than 6/60 at presentation . 64% of these patients maintained their vision**
- **62% of patient has PRP in 2 weeks of presentation**
- **67.34% of patients has IVI in 2 weeks of presentation. 32% of these patients vision improved**

V/A Improvement: Comparing Audit to Reaudit



V/A Improvement: Comparing Audit to Reaudit



Some examples of management plans:

- Left Neovascular glaucoma with iris new vessels, high IOP, Hazy decompensated cornea and hazy fundal view showing signs of a CRVO with haem. ++
- Plan: URGENT PRP Laser to left eye as soon as cornea clears.
- ***Notes to Glaucoma & Medical Retina Consultants.***

- **PL at presentation – No PL at last follow up**

Some examples of management plans:

- Has R rubeosis, retinal peripheral haemorrhages
- Gonio - RE total synechial angle closure and NVA. LE – PAC
- Imp - R NVG due to ischaemic CRVO; L PAC
- Plan: Start monopost BEs, cosopt pf bd RE, Listed for PI LE
- ***See in 2/12***; GP to investigate and treat vascular risk factors.

- **6/24 at presentation – PL at last follow up**

Some examples of management plans:

- Saturday clinic
- right eye rubeosis ,IOP high ,gonio zipped angle in at least 2 quadrants;listed for X2 PRP sessions RIGHT EYE
- refer to medical retina for further assessment and possible IVI Avastin

- ***6/36 at presentation – PL at last follow up***

- B/L PDR with rubeosis LE
- IOP RE 21mmHg LE 36mmHg
- PO diamox 500mg stat; g. latanoprost LE stat
- For B/L PRP today given good fundal view.
- Please check IOP later. Please start patient on g. latanoprost LE until next review.
- ***F/Up in Eye Cas will need more laser***
- ***6/18 PH 6/12at presentation – 6/60 with Tube at last follow up***

Good examples:

- Left neovascular glaucoma secondary to PDR
- Plan: IV Diamox and anti-Glaucoma drops
- ***OCT both eyes-Both eyes CMO-Right ,< 400microns, Left > 400 microns***
- **W/L Left Lucentis x 03 x 04 weeks apart-1 st today, 2 further injections 4 weeks apart booked**
- **Right pre and post injection G.Apraclonidine 1% stat please**
- Left PRP x 2 sessions
- D/W MR and Glaucoma Consultants – Agree with plan and review Glaucoma clinic 1 week
- ***6/60 with PH 6/18 at presentation – 6/9 with tube at last follow up***

Good examples:

- Left rubeotic glaucoma, Left PRP today. and to be repeated in 2 weeks. D/W MR Consultant - Left Avastin on Monday confirmed
- Left Avastin x2 one month apart.
- ***6/36 at presentation – 6/60 at last follow up***

Good examples:

- Seen in Glaucoma Clinic by fellow: LE CRVO with NVE inferiorly and NVI; IOP 40
- D/W MR Consultant - Urgent LE PRPx2 and IVI Avastin
- IVI done next day; Cyclodiode in 1 week; PRP in 2 weeks

- ***6/60 at presentation – 6/24 at last follow up***

Good examples:

- Referred urgently from Optegra
- consultation for right cataract at Optegra; IOP 64 - NVG
- Avastin injection arranged next few days
- ***6/12 at presentation – 6/9 with tube at last follow up***

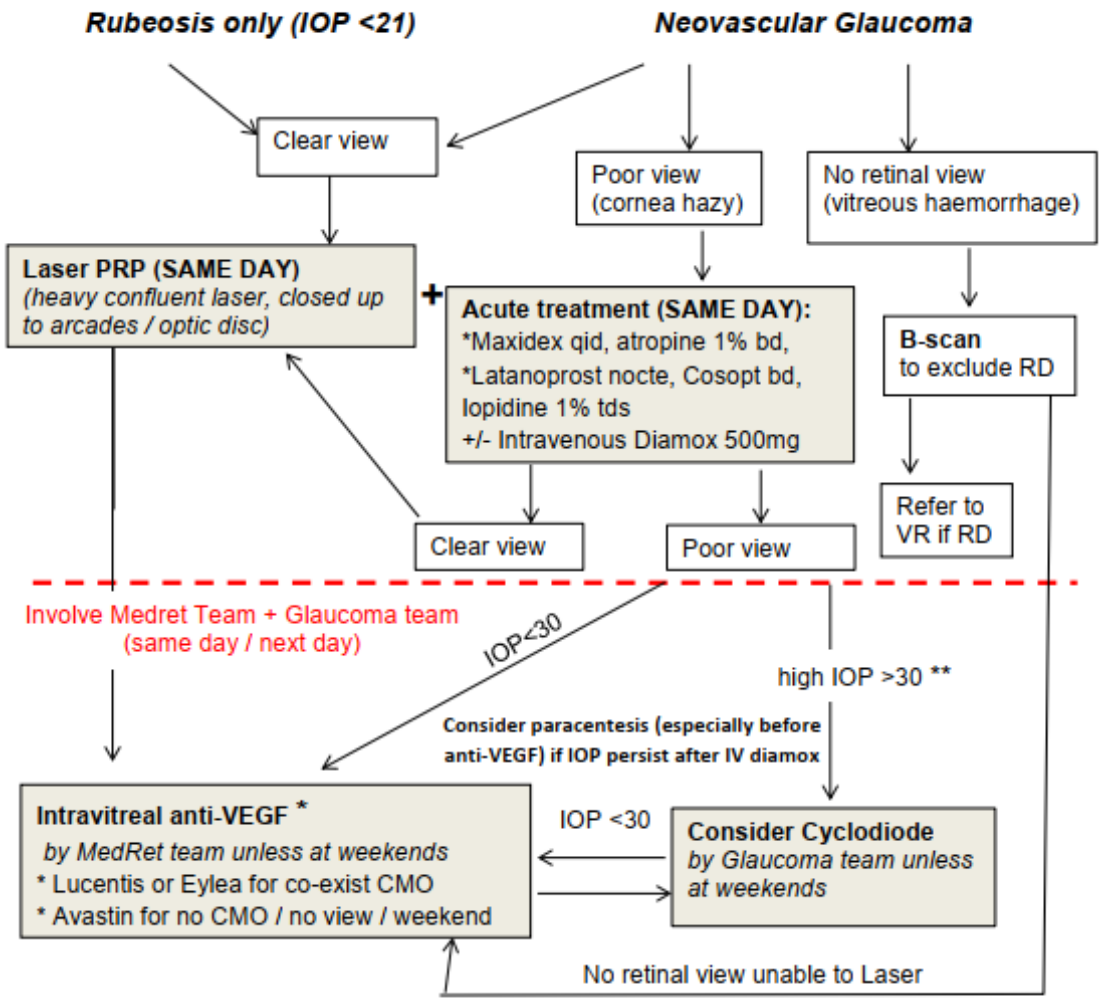
Good examples:

- Right NVI with elevated IOP (60mmHg)
- Seen by MR and Glaucoma Consultant on the day – Urgent Cyclodiode and PRP today
- For urgent IVI avastin tomorrow
- ***6/24 with pin hole 6/18 at presentation – 6/12 with PH 6/9 with Tube at last follow up***

Subgroup analysis: Presenting VA ≥ 6/12

- 12 / 49 eyes (24.45%) at presentation were ≥ 6/12
- 58% received PRP same day and 83.3% received within 2 weeks
- 66.6% received IVI within 2 weeks
- 58% maintained their vision till last follow up

BMEC Neovascular Glaucoma Treatment Protocol



* Aims for both MedRet and Glaucoma Opinions - same day / next day (Mon-Fri)

* * Paracentesis (a temporarily measure) can be performed ad hoc pre- or /and post-anti-VEGF injection if IOP is refractory when cyclodiode procedure is not immediately available.

Weekends:
Avastin (=Bevacizumab) can be obtained from on-call pharmacist (completed online DTC form **OR** yellow Avastin paper form to be handed in to BMEC pharmacy on Monday)
NB: order for Bevacizumab 5mg/0.2ml (one vial) as pharmacist in main hospital site only recognises generic name

Guidance working in BMEC eye casualty:

- Consultant / senior cover for advice
- BMEC departmental protocols
- Subspecialty clinics nearby (medret)

Urgent protocols
- Endophthalmitis protocol
- Neovascular Glaucoma protocol

Fast-track Medret clinics
- Macula, RVO

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