



BARS Conference 2022

VITRECTOMY FOR THE COMPLICATIONS OF PROLIFERATIVE DIABETIC RETINOPATHY

David Steel



- ▶ What are the complication of PDR ?
- ▶ How common are they ?
- ▶ When do we operate ?
- ▶ How do we operate ?
- ▶ What are the results ?
- ▶ ****Modern role of vitrectomy**
- ▶ Potential alternatives ?

TO COVER



- ▶ Estimated 463 million diabetics globally
- ▶ Projected to increase by ~50.0% in next 25 years to over 700 million
- ▶ 1 in 8 of all adults by 2045
- ▶ PDR prevalence 1.7% (range 0.36–13%) of all diabetics
- ▶ It's a big problem and it blinds people

PROLIFERATIVE DIABETIC RETINOPATHY



Why do people with diabetes still require vitrectomy ?

- 15-50% of diabetics are undiagnosed
- Only 12% are controlled (BP, Cholesterol, HbA1c)
Cheung BM et al. Am J Med 2009;122:443–453.
- 15%+ don't attend screening where it exists
- Some patients are undertreated ? Varies widely
- Response to 'full' laser treatment is not 100%.....



Response to laser?

High Risk PDR : risk factors for vision loss (4 point score)

- Any new vessels
- NVD
- NVD >1/3 DA and NVE >1/2 DA
- Vitreous haemorrhage

Two year incidence of severe visual loss by number of risk factors

Number of risk factors	Untreated	PRP
0 (NPDR)	3.6	2
1 (eg small nve)	6.7	3.5
2 (eg small NVD)	8.5	4
3 (eg larger NVD)	26.7	14
4 (eg Vit Haem)	36.9	18



‘Retinopathic momentum’

New vessel persistence and fibrovascular proliferation

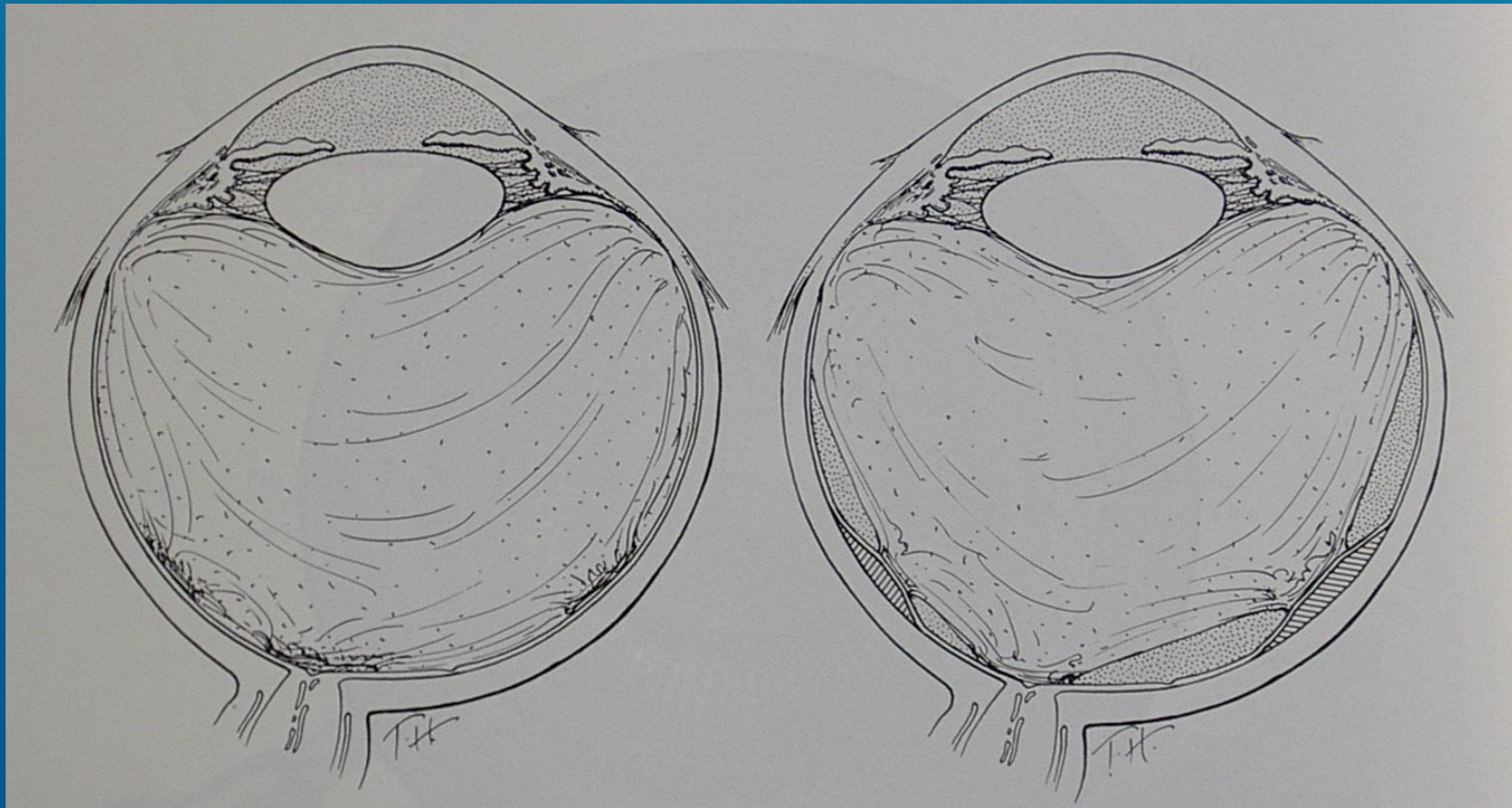


GM008X#2 Timer: 09:53:11.49

New vessels on their own don't (rarely) cause problems ...

Traction on NV attachment points causes
vitreous haemorrhage and traction

NV regression is not the end of the story



Proliferative diabetic **vitreo**retinopathy





How many people with PDR require vitrectomy ?

- ▶ **Trials (eg ETDRS 4% at 2 years)**
- ▶ **Real world in a screened population (eg ~8% of all PDR in UK)**
Vaideanu et al. Rate of Diabetic Vitrectomy. Ophthalmic Epidemiology, 2014; 21:3, 178-183)

**OCULAR FINDINGS AT INITIAL PAN
RETINAL PHOTOCOAGULATION FOR
PROLIFERATIVE DIABETIC
RETINOPATHY PREDICT THE NEED FOR
FUTURE PARS PLANA VITRECTOMY**

RAVI PARIKH, MD, MPH,* ROHAN J. SHAH, MD,* JACOB P. VANHOUTEN, MS,†‡
EDWARD F. CHERNEY, MD*

*Depends on presentation
grade*

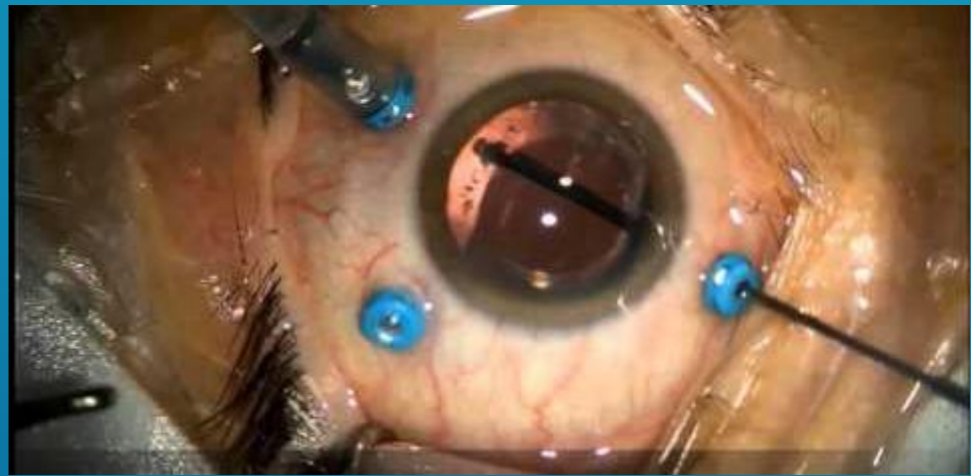
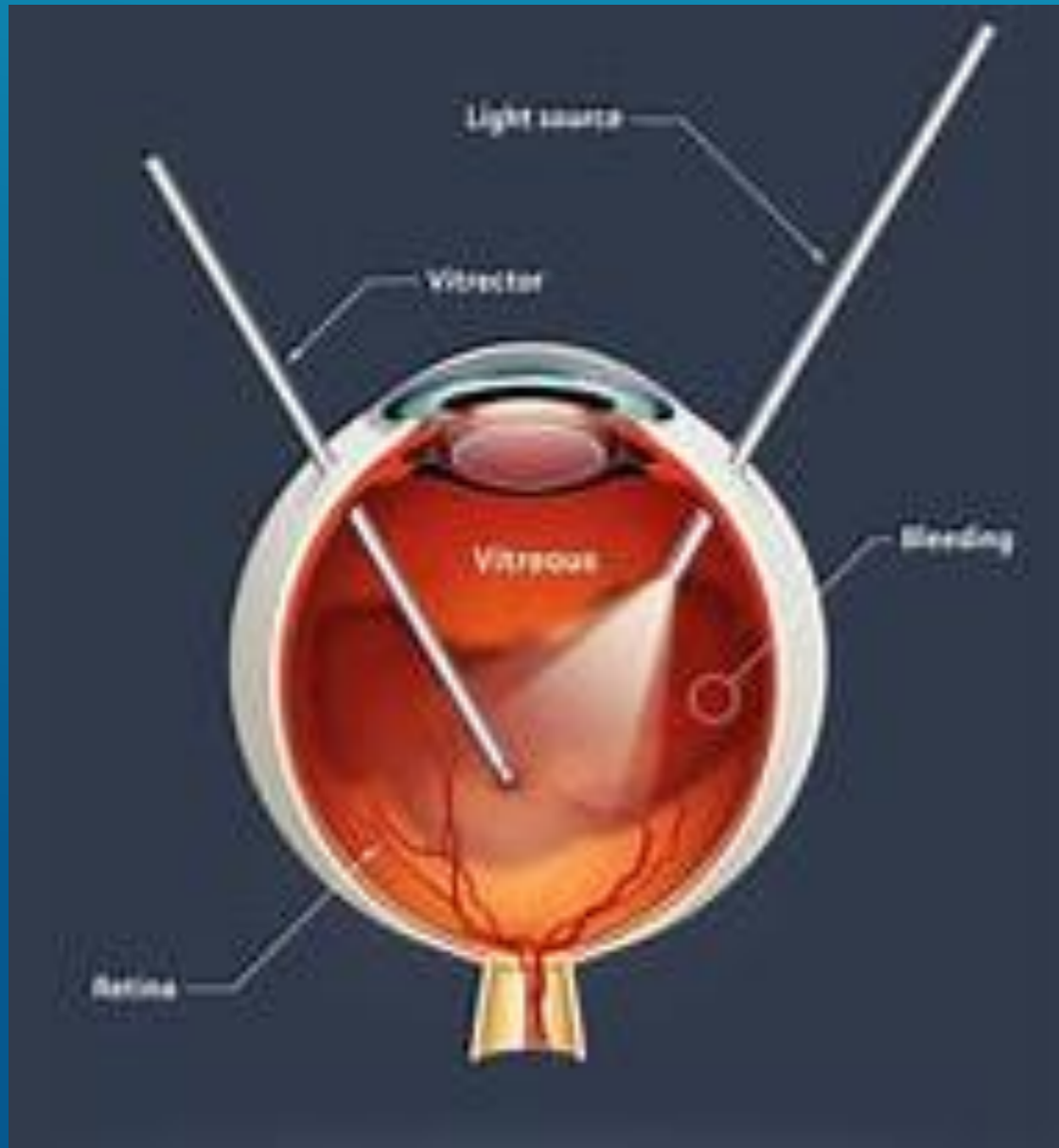
- Presenting with HR PDR without VH 16% at 2 years.
- PDR and VH 35% at 2 years
- PDR and traction/fibrosis or NVI 50% at 2 years



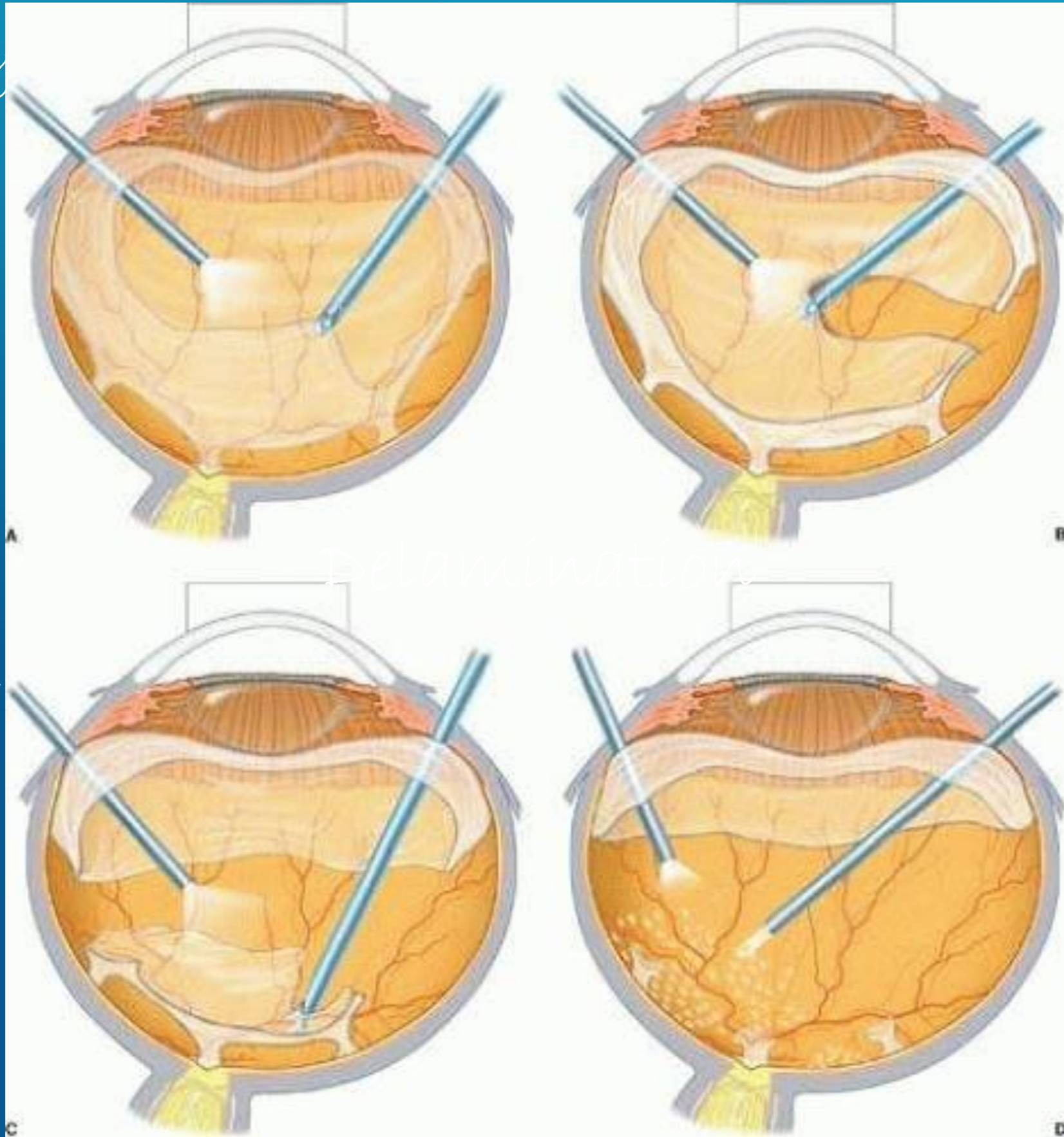
- ▶ 90% done under Local anaesthetic as day case
- ▶ Take between 30 minutes to 3 hours depending on complexity – most diabetic vitrectomies about 60-90 minutes

HOW DO WE DO VITRECTOMY ?





Core vitrectomy
with high
cutting rate
vitrectomy

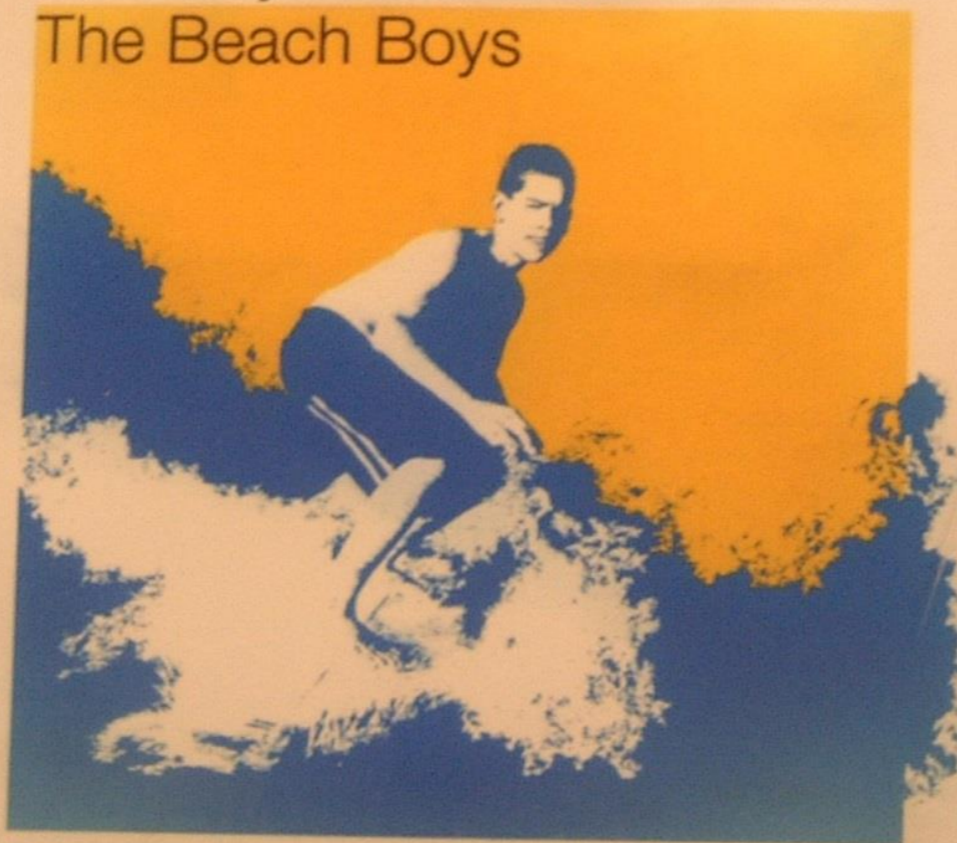


Circumcision
of membranes
with VR
attachment

Segmentation
&
Delamination

Endolaser

The Very Best Of
The Beach Boys

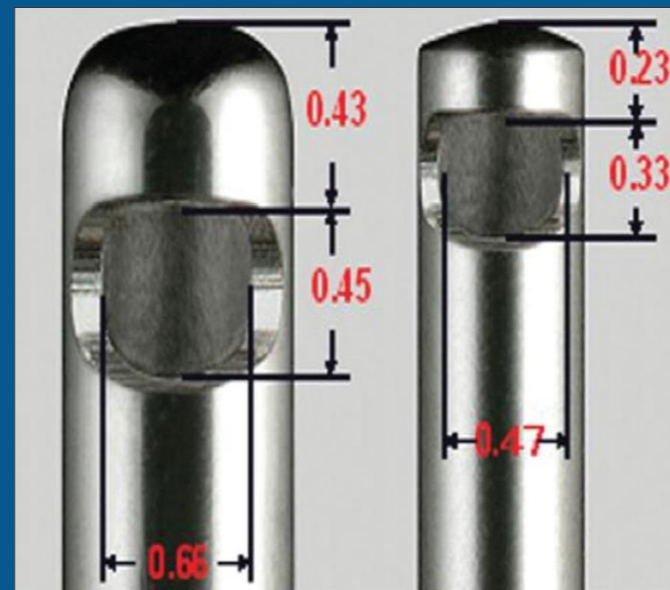
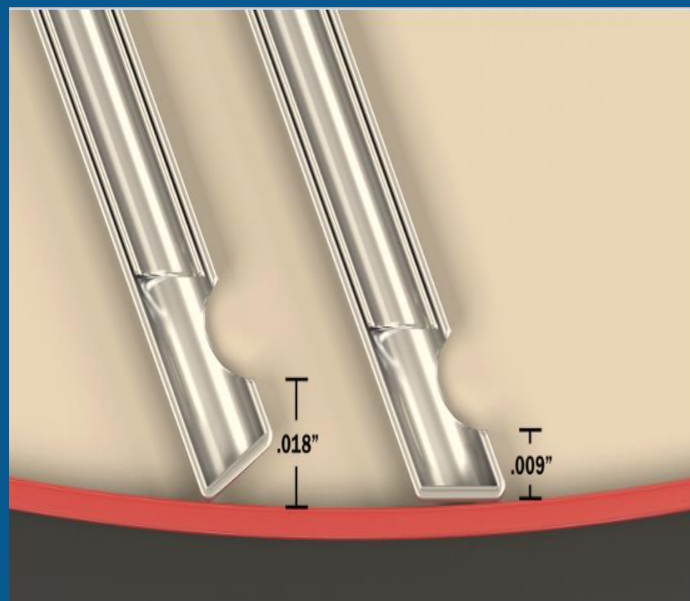
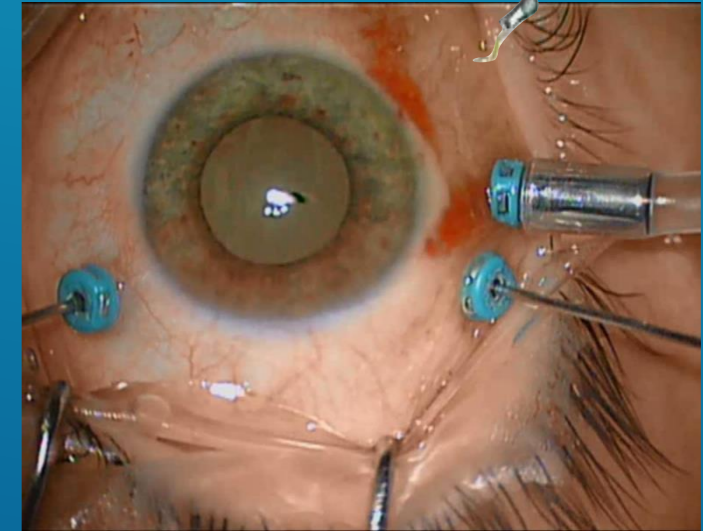


Digitally Remastered



Vitrectomy has massively improved !

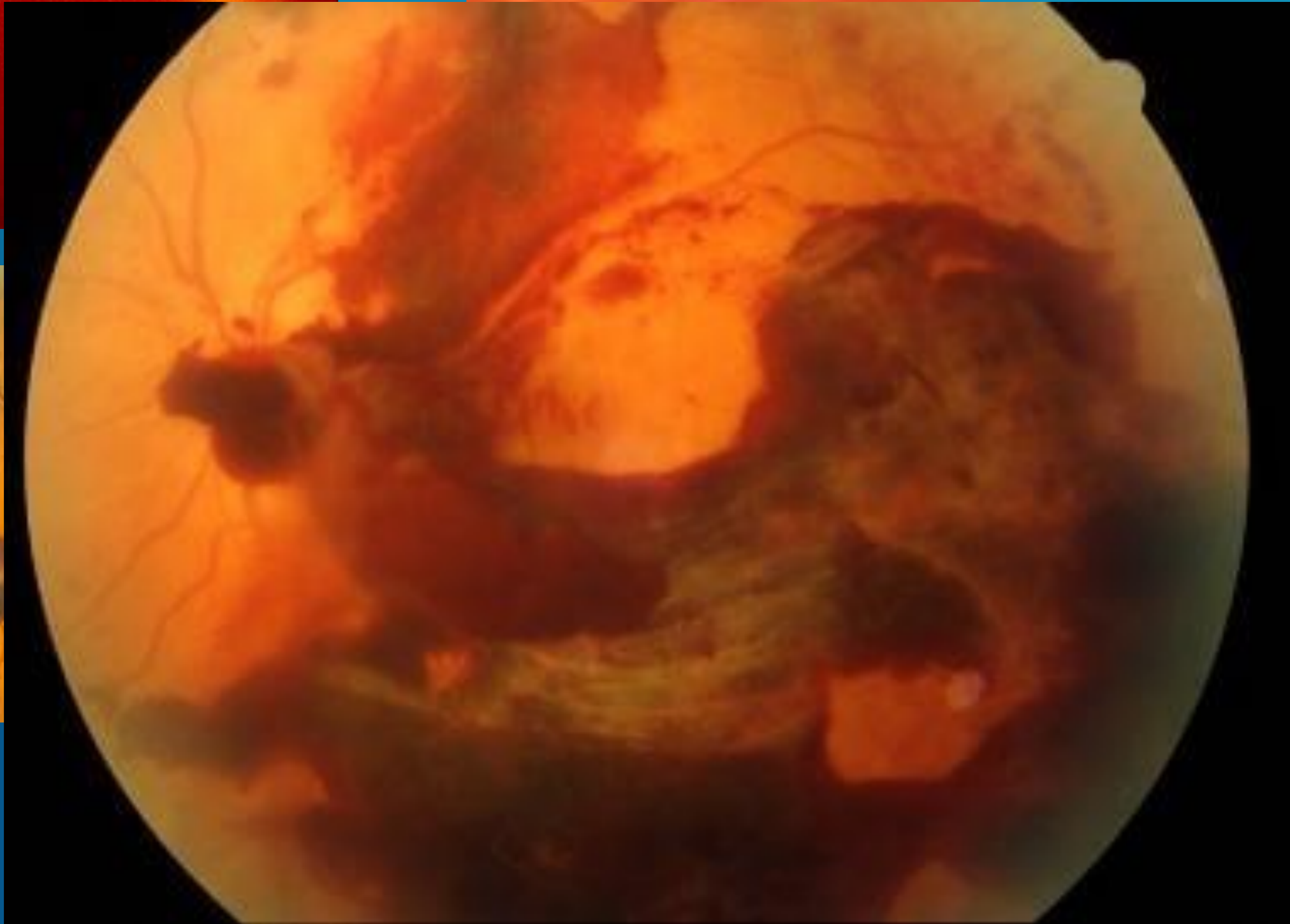
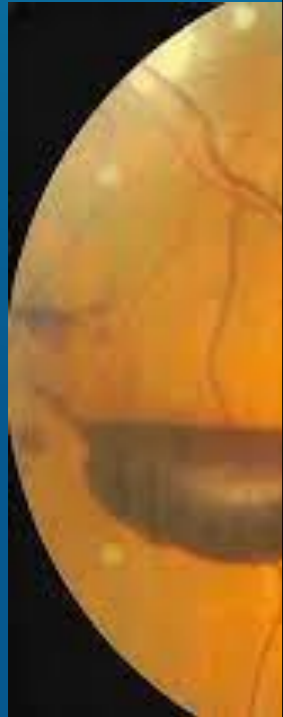
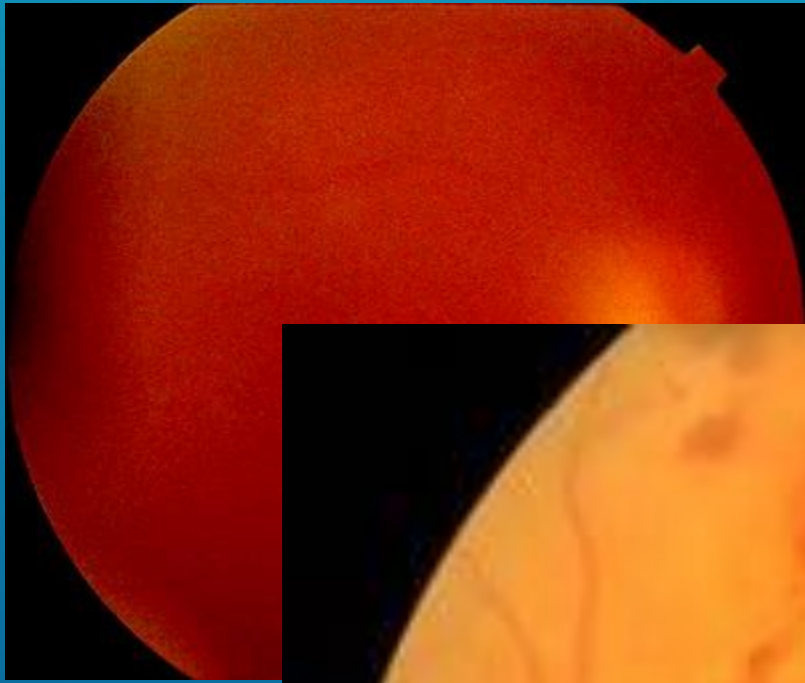
- ▶ Intra-operative endolaser and IOP control
- ▶ Vitrectomy technology
- ▶ Wide angle viewing and illumination
- ▶ Vitreoschisis recognition and TMC staining
- ▶ Pre op anti VEGFs



INDICATIONS FOR VITRECTOMY

- Vitreous haemorrhage
- Macular traction
- Combined rhegmatogenous and tractional retinal detachment
- Pre-emptive vitrectomy to improve prognosis





VITREOUS HAEMORRHAGE

- Dense vitreous haemorrhage for no more than 6 months (immediate versus 1 year deferred vitrectomy)

Early Vitrectomy for Severe Vitreous Hemorrhage in Diabetic Retinopathy

Two-Year Results of a Randomized Trial
Diabetic Retinopathy Vitrectomy Study Report 2

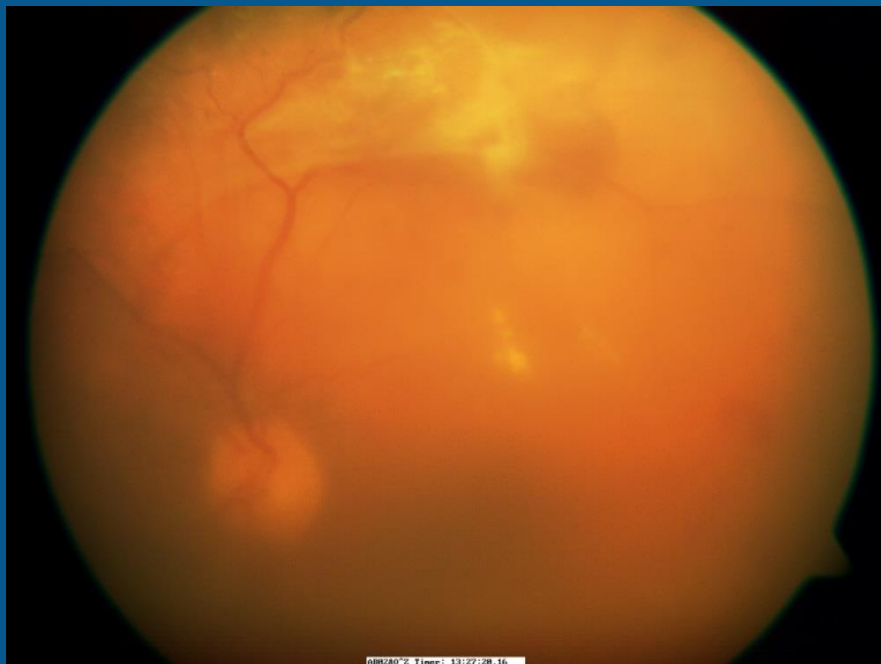
The Diabetic Retinopathy Vitrectomy Study Research Group

Surgery within ~2 months for type 1 with VH and/or known/suspected traction

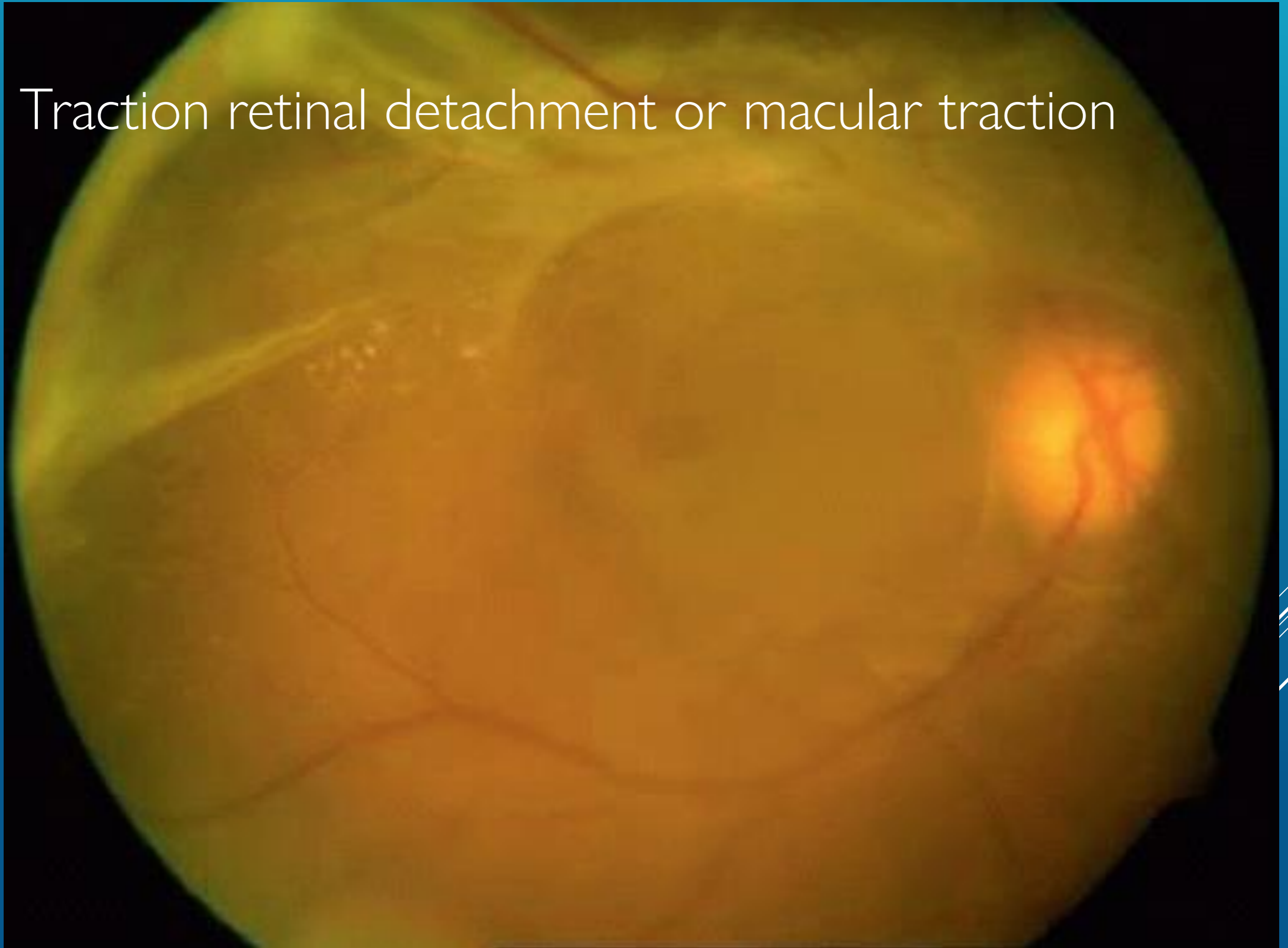


Remember its not purely about the density of the haemorrhage or the visual acuity

- ▶ Be wary of missing traction and treatable maculopathy behind vitreous haemorrhages
- ▶ nuisance bleeds, only eye, patient needs

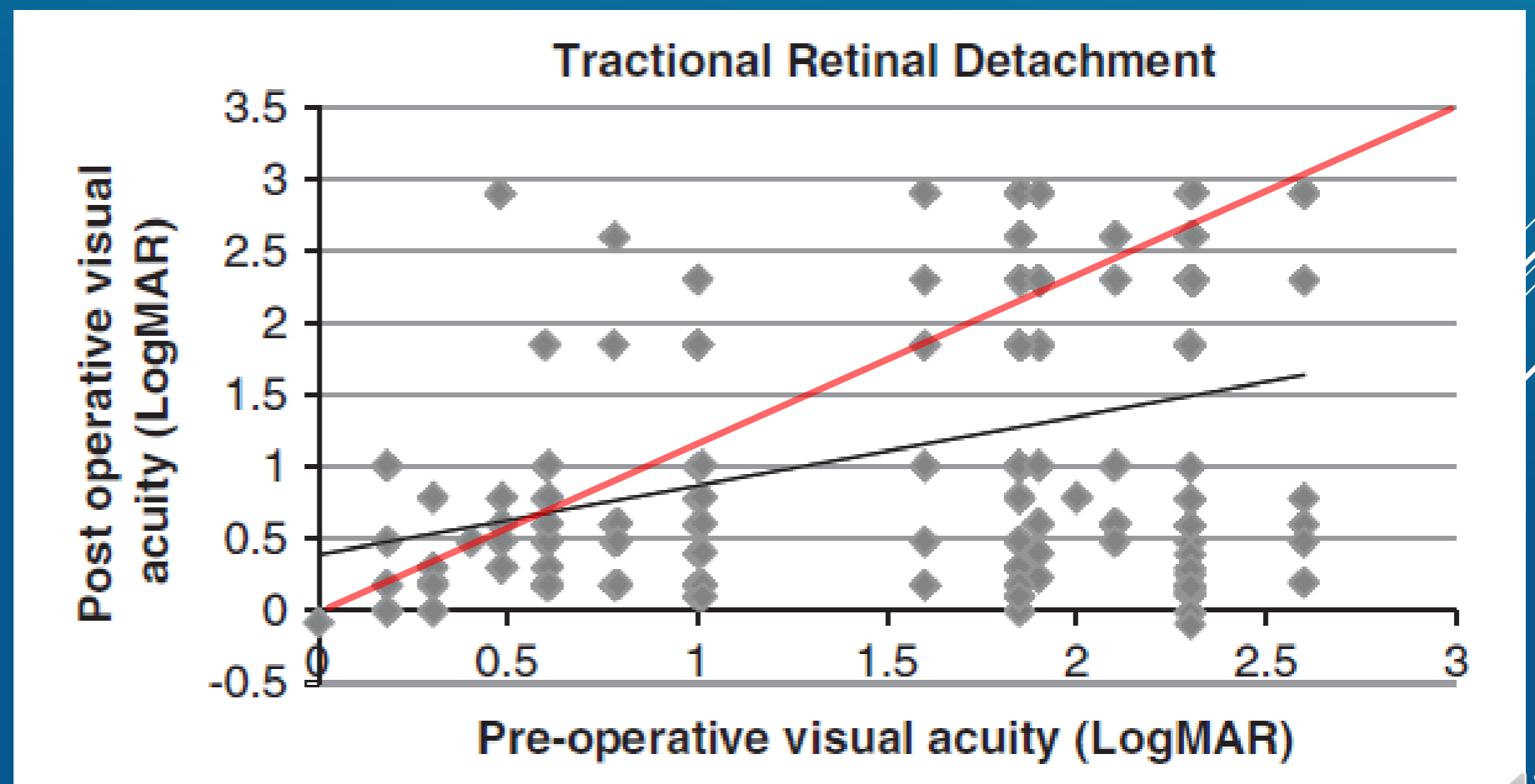


Traction retinal detachment or macular traction



MACULAR TRACTION

Post op Vision – highly related to initial visual acuity- *do surgery early before vision drops too much*



CLINICAL STUDY

Age (2013) 26, 574-580
© 2013 Munksgaard Publishers Limited. All rights reserved. DOI: 10.1111/j.1365-2214.2012.03111.x

Surgical and visual outcome following 20-gauge vitrectomy in proliferative diabetic retinopathy over a 10-year period, evidence for change in practice

B Gupta, R Wong, S Sivaprasad and TH Williamson

CLINICAL STUDY

Visual and anatomical outcomes following vitrectomy for complications of diabetic retinopathy: The DRIVE UK Study

B Gupta¹, S Sivaprasad², R Wong³, A Laidlaw⁴, TL Jackson⁵, D McHugh⁶ and TH Williamson⁷



Original Investigation

The Royal College of Ophthalmologists' National Ophthalmology Database Study of Vitreoretinal Surgery Report 6, Diabetic Vitrectomy

Timothy L. Jackson, PhD, FRCOphth; Robert L. Johnston, FRCOphth; Paul H. J. Donachie, MSc;
Tom H. Williamson, MD, FRCOphth; John M. Sparrow, DPhil, FRCOphth; David H. W. Steel, FRCOphth

~65% visual gain (>0.3 logMAR better)

8-15% visual loss (>0.3 logMAR loss) depending on severity of disease

[Compared with no vitrectomy at this stage of ~40-100% worse depending on severity....]



What were the major prognostic factors for outcome ?

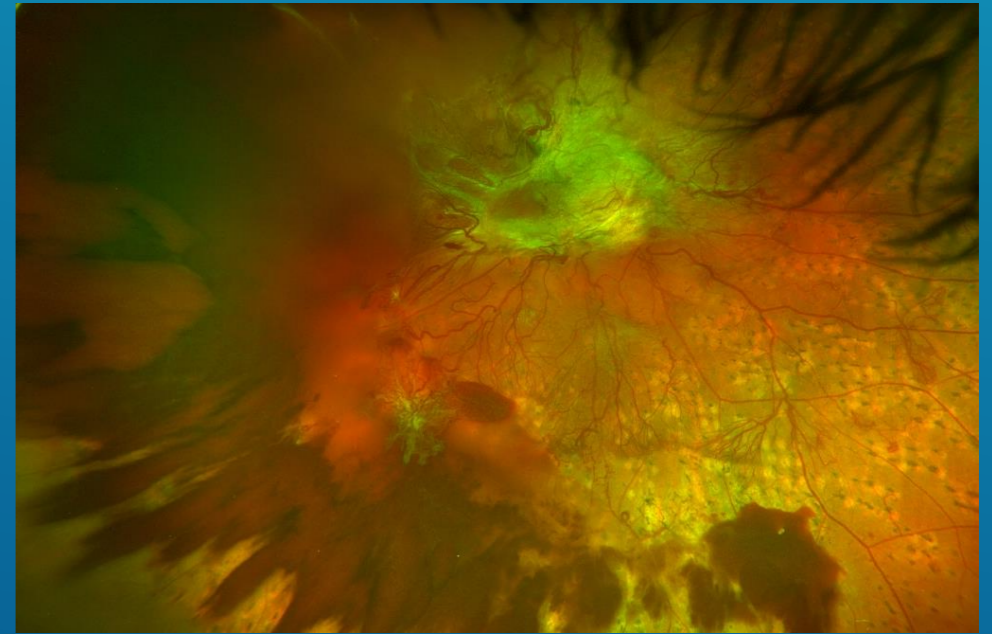
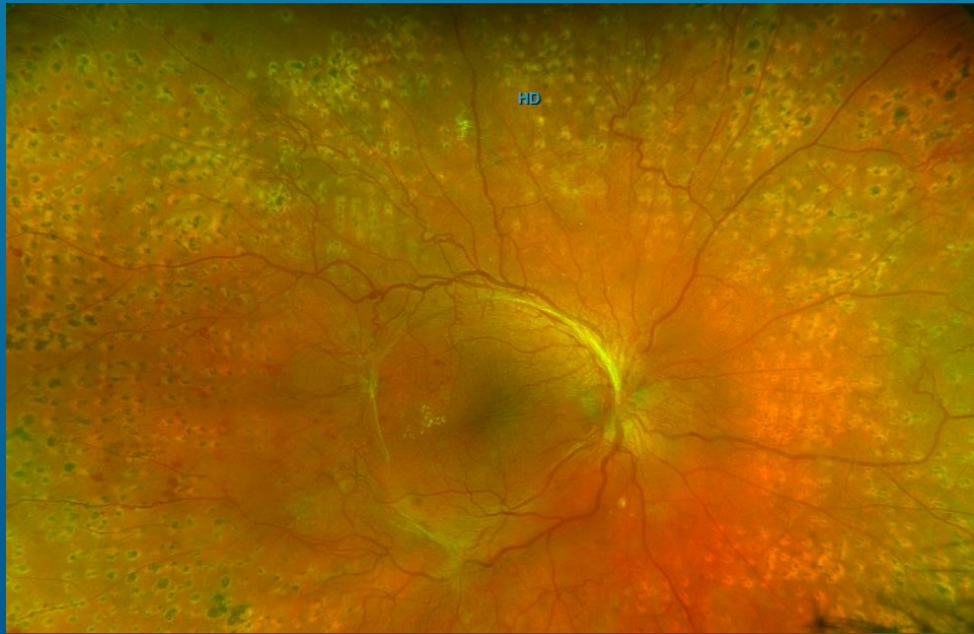
- ▶ Tractional retinal detachment anywhere
 - ▶ Signs of new vessel activity
- } DRVS

**Do surgery early*

**Make retinopathy as inactive as possible*



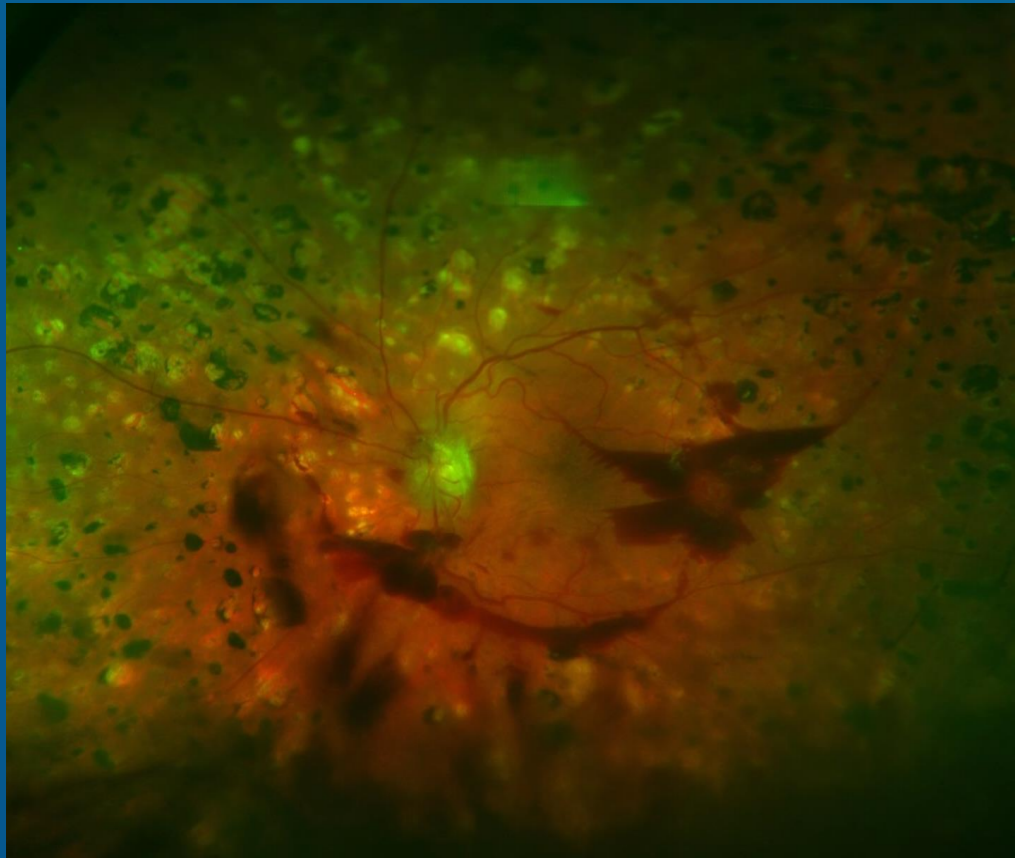
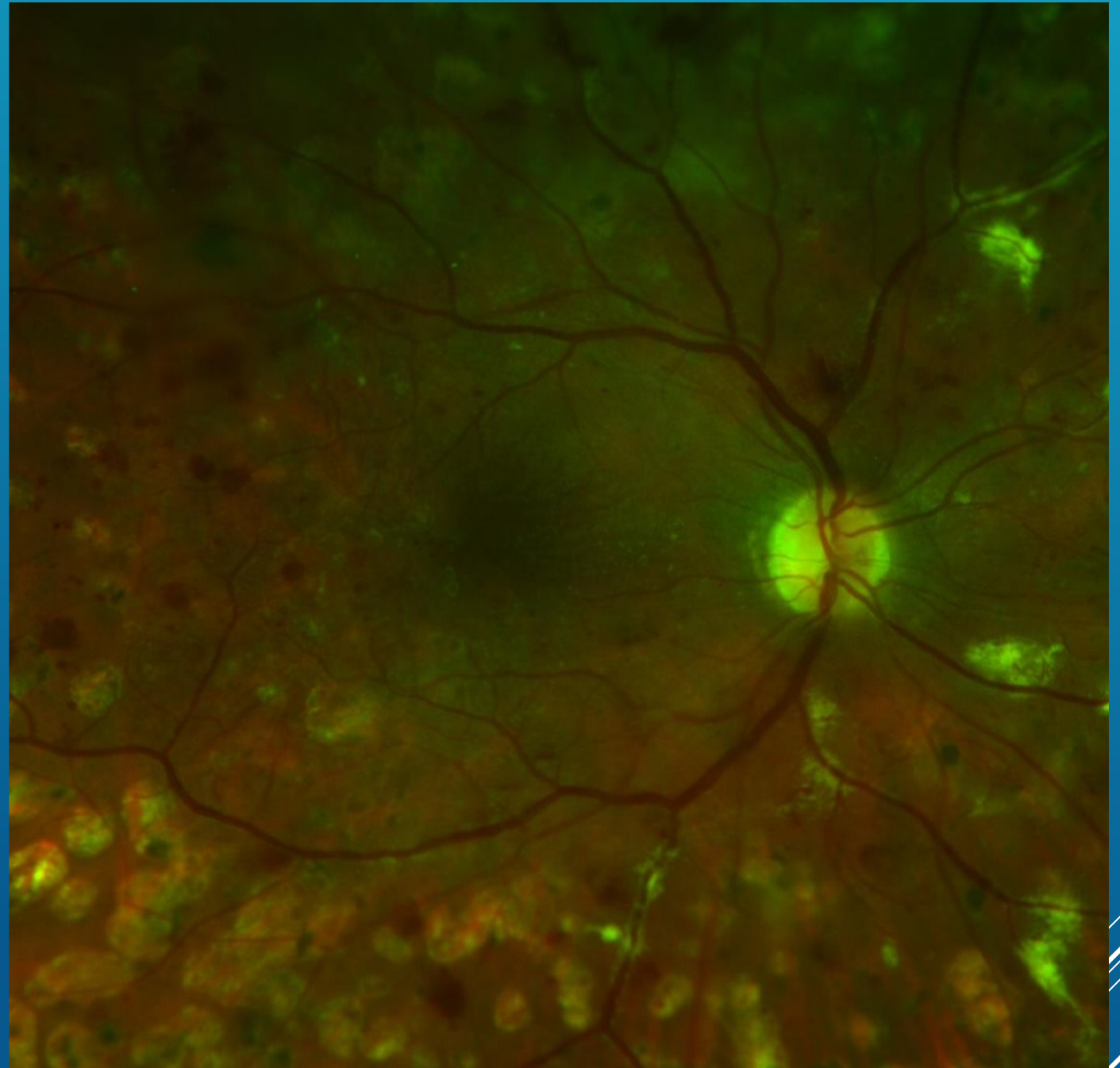
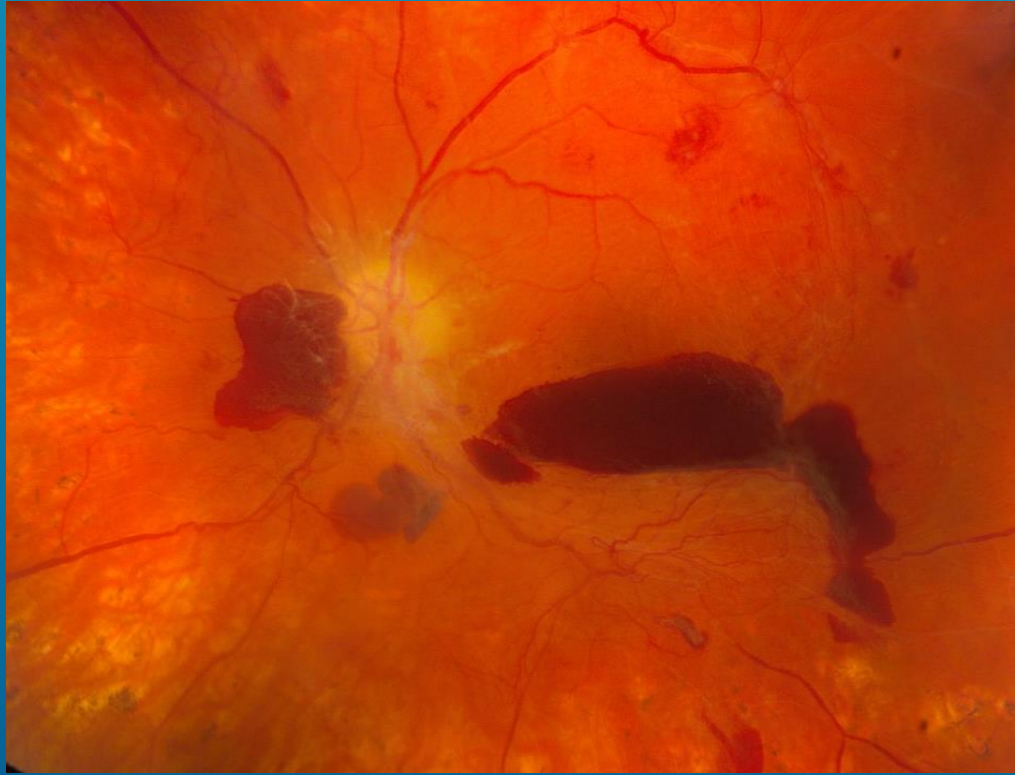
Pre-emptive rather than reactive vitrectomy



Tan SZ, Steel DH et al. Eye (Lond). 2022 Jul 21.

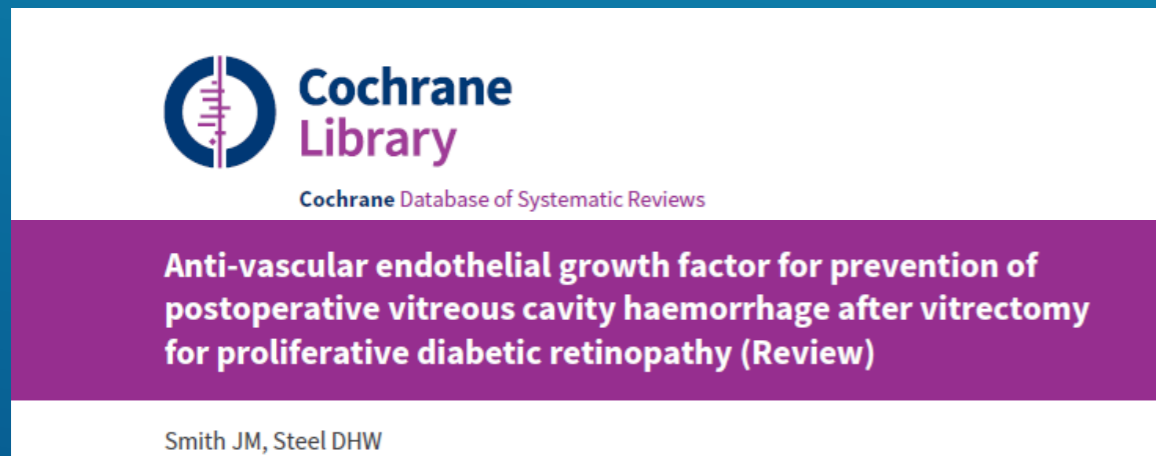
Do vitrectomy early before
severe contraction occurs – the results
are far better for the patient





Making the disease inactive prior to vitrectomy

- ▶ Pre op anti VEGFs (Level 1 evidence) given 2-7 days preop



Benefits:

- Reduced operative time
- Reduced operative bleeding
- Reduced retinal breaks
- Reduced postoperative vitreous cavity haemorrhage
- Improved vision at 6 months





Does treatment with anti-VEGFs avoid the need for vitrectomy ?

Protocol S (US) and Clarity (UK) trials

JAMA. 2015 November 24; 314(20): 2137–2146. doi:10.1001/jama.2015.15217.

Panretinal Photocoagulation vs Intravitreal Ranibizumab for Proliferative Diabetic Retinopathy: A Randomized Clinical Trial

With very high compliance,
high cost and life long follow up

Clinical efficacy of intravitreal aflibercept versus panretinal photocoagulation for best corrected visual acuity in patients with proliferative diabetic retinopathy at 52 weeks (CLARITY): a multicentre, single-blinded, randomised, controlled, phase 2b, non-inferiority trial

Reduce need for vitrectomy (compared with laser) by ~

- 80% after 1 year,
- 50% after 2 years,
- 25% after 5 years

- they don't inactivate disease....best given **with** laser



Can people with PDR related VH be treated with anti VEGFs alone ?

- DRCR net Protocol AB

Research

JAMA | **Original Investigation**

Effect of Intravitreal Aflibercept vs Vitrectomy With Panretinal Photocoagulation on Visual Acuity in Patients With Vitreous Hemorrhage From Proliferative Diabetic Retinopathy A Randomized Clinical Trial

Andrew N. Antoszyk, MD; Adam R. Glassman, MS; Wesley T. Beaulieu, PhD; Lee M. Jampol, MD; Chirag D. Jhaveri, MD; Omar S. Punjabi, MD; Hani Salehi-Had, MD; John A. Wells III, MD; Maureen G. Maguire, PhD; Cynthia R. Stockdale, MSPH; Daniel F. Martin, MD; Jennifer K. Sun, MD, MPH; for the DRCR Retina Network



With thanks to Anna Song and the Newcastle University Retinal Infographics Group

Intravitreal Aflibercept vs Vitrectomy with Panretinal Photocoagulation for Vitreous Haemorrhage from Proliferative Diabetic Retinopathy

A Multi-Centre Randomised Clinical Trial by the DRCR Retina Network



STUDY DESIGN

- Multi-centre (39 sites in US and Canada)
- Unmasked (investigator + patient)
- 2 year follow-up
- n = 205



INCLUSION CRITERIA

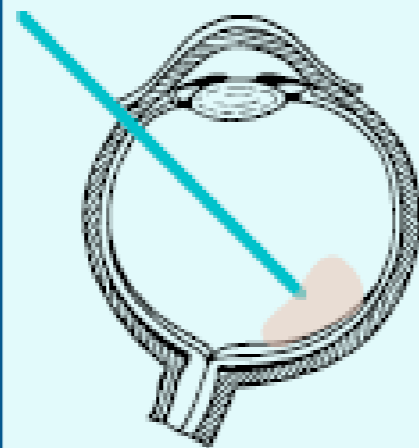
- Adults with type 1 or 2 diabetes
- Vitreous haemorrhage from proliferative diabetic retinopathy causing vision impairment



EXCLUSION CRITERIA

- Known diabetic macular oedema
- Tractional retinal detachments involving or threatening the macula
- Neovascular glaucoma
- Prior vitrectomy

Vitrectomy + PRP Group



n = 105

Within 2 weeks of randomization:

1 Vitrectomy + PRP

If vitreous haemorrhage fails to clear 4 weeks post-surgery:

2 Aflibercept (2 monthly) ± 4 weekly at discretion of investigators

If vitreous haemorrhage fails to clear following 2 aflibercept injections:

3 Repeat vitrectomy

Aflibercept Group



n = 100

1 Injection at baseline, 4, 8, 12 weeks

2 Injection at 16 weeks (Deferred if complete fundus viewable with absent neovascularisation)

3 Injection at 24 weeks (Unless eye has stabilised i.e. unchanged for 2 consecutive visits)

From 16 weeks if persistent vitreous haemorrhage following 2 monthly injections:

4 Vitrectomy

43% had pre op anti-VEGF



- ▶ No great difference in vision at 6 months onward
- ▶ 33% of aflibercept eyes required vitrectomy
- ▶ Recurrent haem 3 times commoner in aflibercept group
- ▶ 33% of vitrectomy eyes required aflibercept
- ▶ Aflibercept eyes require life long follow up and injections on an ongoing basis

RESULTS

CONCLUSION

- ▶ Vitrectomy surgery is still required in a variable proportion of patients with PDR
- ▶ It is best done early if there is traction or risk of worsening is high, with extensive NVs and traction/VH
- ▶ Anti VEGFs are an option in patients with VH and without macular traction but vitrectomy will still be needed in 33% and long term therapy likely required



THANK YOU FOR LISTENING

david.steel@ncl.ac.uk

