DIABETIC RETINOPATHY GRADING & GUIDELINES

WEH Teaching 23rd October 2015

Background

Prevalence

- Affects upto 40% of diabetic populations.
- 60% of T1DM develop Proliferative Diabetic Retinopathy after 30 years.

Risk factors

- Duration of diabetes
- Poor control
- Pregnancy
- Hypertension
- Nephropathy
- Other: hyperlipidaemia, smoking, cataract surgery, obesity and anaemia

Pathogenesis

- Mechanisms of cellular damage
  - Intracellular sorbitol, oxidative stress, advanced glycation end products, PKC activation.
- Capillaropathy
  - Vessel wall changes
  - Haematological changes
- Neovascularisation
  - Balance of VEGF and endostatin

Diabetic Eye Screening Programme

Background diabetic retinopathy (BDR)

Microaneurysms, dot and blot haemorrhages, exudates.

Diabetic maculopathy

Vision threatening oedema due to generalised leak or ischaemia at the macula (on FFA.)

Pre-proliferative diabetic retinopathy (PPDR)

Cotton wool spots, venous changes, intraretinal microvascular anomalies (IRMA), deep retinal haemorrhages

Proliferative diabetic retinopathy (PDR)

Neovascularisation within one disc diameter of disc (NVD) or new vessels elsewhere (NVE)

Advanced diabetic eye disease

Tractional retinal detachment, persistent vitreous haemorrhage and neovascular glaucoma

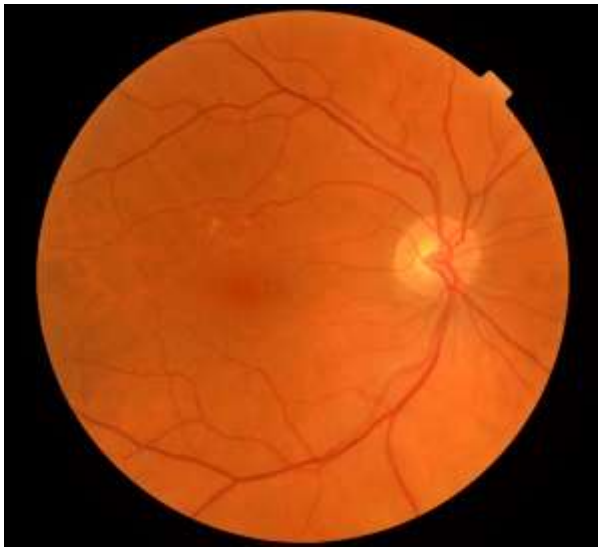
Diabetic Eye Screening Programme Classification

NSC	Term	Features	Action
R0	No DR	Normal retina	Keep in DESP, annual digital photograph
R1	Mild non-proliferative	Haemorrhages, microaneurysms, any exudate, stable venous loop, isolated cotton wool spot	Keep in DESP
R2	Pre-proliferative	Multiple blot haemorrhages, IRMA, venous beading, venous reduplication	Refer to HES
R3A	Proliferative (Active) retinopathy	New vessel formation at the disc (NVD) or elsewhere (NVE). Pre-retinal fibrosis +/- tractional retinal detachment	Urgent referral to HES
R3S	Treated proliferative retinopathy (stable)	Evidence of peripheral retinal laser treatment and stable retina, old retinal fibrosis, no signs of active proliferation	Annual rescreen

DESP Classification

NSC	Term	Features	Action
M0		No maculopathy	Annual rescreen
M1	Diabetic maculopathy	• Exudate < / = 1DD of fovea • Circinate exudates within macula • Microaneurysm or haemorrhage </= 1DD of fovea associated with best VA </= 6/12	Refer HES
P	Photocoagulation	Small retinal scars throughout the peripheral retina	
OL/ UG	Other lesion / Ungradable	Cataract	Refer HES

M0 or M1 maculopathy?



HES – assessment in clinic

- 1) Review of blood results, glycaemic control and other risk factors. Access to diabetic nurse.
- 2) Digital photography
- 3) Macular OCT
- 4) Slit lamp biomicroscopy

- Streamlining the service to avoid bottlenecks is key.
  - At Hillingdon 20/10/15 diabetic clinic –
    - 12 patients photographed by 9.12am.
    - 30 patients photographed by 10am.

Clinical trials: Diabetic Retinopathy

DCCT: Diabetes Control and Complications Trial 1993

Intensive blood glucose control in T1DM reduces rate of systemic complications. 6 year follow up, 1441 patients.
Intensive therapy reduced rate of diabetic retinopathy by 76%.

UKPDS: United Kingdom Prospective Diabetes Study 1998

Intensive blood glucose control in newly diagnosed T2DM reduces rate of systemic complications. 20 year, follow up 3867 participants.
With increased glucose control (HbA1C 7.0% vs 7.9%) there was a 21% reduction in progression of retinopathy.

DRS: Diabetic Retinopathy Study 1976

60% reduction of severe visual loss in eyes treated with argon laser compared with control at 2 years.

ETDRS: Early treatment of diabetic retinopathy study 1989

Recruited NPDR and PDR patients without high risk characteristics. Guidelines defining timing of optimal timing of PRP, scatter laser and grading of retinopathy were also developed. Early treatment froup – 5 year risk of severe visual loss was 2-6% cmpared to 4-10% in the deferred group.

Recommendations for Diabetic Retinopathy

- Background retinopathy
  - No treatment
  - Monitored with annual digital photogrpahy in screening programme
  - Optimise care of diabetic control

- Pre proliferative
  - Regular slit lamp biomicroscopy for feature of retinal ischaemia
  - 4-6 monthly
  - Digital fundus colour photo as adjunct +/- FFA
  - Consider early PRP in very severe NPDR
  - Early treatment can reduce progression to high risk PDR by 50%

- PRP should be considered for pre proliferative DR:
  - In older patients with T2DM
  - Difficult retinal view
  - Prior to cataract surgery: as inflammation can be associated with progression
  - In ONLY eye where first was lost to PDR
  - Regular clinic attendance is likely poor

- Proliferative diabetic retinopathy
  - Full PRP for nVD, NVE
  - Delivered same day or within 2 weeks of diagnosis
  - Baseline FFA to assess macular perfusion, retinal ischaemia; should not delay PRP
- Principles of PRP technique
  - Rx all quadrants of pre and post equatorial retina outside macular vascular arcades.
  - Emphasis on ischaemic retina near NVE but avoid direct NV application.
  - Burn power enough to create grey white retinal response
  - 300-400 microns burn size, 10-50ms duration, 1-1.5 spacing (532nm argon green laser)
  - Titrate energy when lasering periphery

- Advanced PDR
  - When PRP appear to have little effect on new vessel progression, development of TRD, consider early vitrectomy to preserve sight in T1DM. (DRVS 1985)
  - Early vitrectomy if delay in applying PRP following vitreous haemorrhage or poor retinal view.
  - Consdier intravitreal anti VEGF injection prior to vitrectomy to reduce risk of intraoperative complications and surgical complications.

Diabetic maculopathy

	Term	Features
M0		No maculopathy
M1	Diabetic maculopathy	• Exudate < / = 1DD of fovea • Circinate exudates within macula • Microaneurysm or haemorrhage </= 1DD of fovea associated with best VA </= 6/12
	CSMO	• Retinal thickening at or within 500 microns of fovea • Hard exudates at or within 500 microns of the fovea if associated with adjacent retinal thickening • Area of retinal thickening one disc area in size, at least part of which is within one disc diameter of fovea.

Clinical trials: Diabetic Maculopathy

ETDRS: Early treatment of diabetic retinopathy study 1989

In eyes with CSMO, moderate visual loss (15 or more letters in ETDRS charts) was reduced form 24% to 12% at 3 years with prompt grid laser treatment.

BOLT: Bevacizumab or laser treatment in managing diabetic macular oedema 2012

Compared intravitreal bevacizumab with argon macular laser in treatment of CSMO associated with DR. 3 x 6 weekly injections. At follow up, injected group did better gaining 8 ETDRS letters versus 0.5 ETDRS letters lost in the macular laser group.

DRCRnet: Diabetic retinopathy clinical research network 2010

Compared ranibizumab, triamcinolone (IVTA) and laser treatments in patients with diabetic macular oedema. 4 groups, 1) sham injection + laser, 2) ranibizumab + laser, 3) triamcinolone + laser, 4) ranibizumab + deferred laser.
Ranibizumab had best visual outcomes overall. Subgroup analysis suggested IVTA improvement confounded by cataract formation.

DA VINCI Study 2012

To compare VEGF trap-eye (aflibercept) with laser photocoagulation in DMO. Mean gain in VA at 1 yr was 13.1 letters in 2mg 4 weekly group vs -1.3 letters in laser treated group.

FAME: Fluocinolone Acetonide for Macular Edema 2012

To assess safety and efficacy of sustained release intravitreal ifluocinolone implants (Iluvien,) in patients with DMO persisting despite previous laser therapy. 28% of pts with high dose implant reported significant increased rate of improvement to 15 ETDRS letters compared to 19% in sham group. Complications: cataract + glaucoma.

CSMO	Centre involved?	VA	Phakic?	OCT	Rx
YES	NO		Either		Laser
YES	YES	Normal / min. reduced (>78 letters)	Either		Laser or observe if leak v close to fovea / not safe to laser
YES	YES	78-24 letters	Either	>250 microns central subfield thickness	VEGF inj +/- laser. If non responder consider IVTA implant
YES	YES	78-24 letters	Pseudophakic	>250 microns central subfield thickness	VEGF inj OR IVTA +/- laser OR fluocinolone (Iluvien) implant if unresponsive to other Rx.

THANK YOU