BrienHoldenVisionInstitute

CLINICAL TECHNIQUES: POSTERIOR EYE

THINK

A person has diabetes. You want to look at their retina to see if they have diabetic retinopathy. What instrument do you need?

WHAT YOU WILL LEARN

When you have worked through this unit you should be able to:

- Describe when to use an Amsler Grid
- Use the Amsler Grid to assess a person's central visual field
- Examine the eye with a monocular direct ophthalmoscope.

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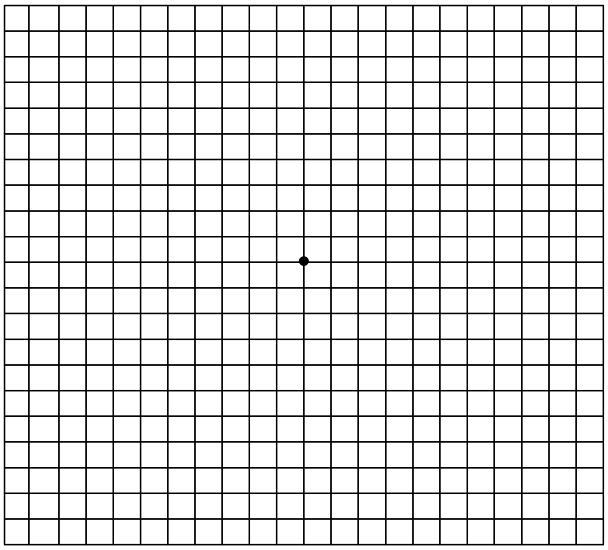
AMSLER GRID

WHAT IS IT AND WHY IS IT USED?	• The Amsler grid is a simple screening test to assess a person's central visual field • It consists of a grid of evenly spaced black vertical and horizontal lines on white paper (or white lines on black paper) • There is a small dot in the centre of the grid • If a person has an abnormal central visual field, they may have a problem with their macula (the centre of the retina), such as macular degeneration • It is also a good test which people with macular problems can use to monitor their own vision at home • The Amsler grid is performed at near, one eye at a time (monocularly).  ***Figure 23-1: Amsler Grid***

HOW IS IT DONE?	• Instruct the person to wear their near spectacles (if they have any)
	• Ask the person to hold the chart at about 40 cm
	• Cover their left eye as you test the right eye
	• Ask the person if they see the dot in the centre of the grid
	• They need to stare at the central dot throughout the whole test
	• Ask the person:
	  ○ "While you are looking only at the dot in the centre of the grid, do you also see all four corners and all four sides of the grid at the same time?"
	  ○ "Are all the horizontal and vertical lines straight and parallel? Or do you see any distorted or wavy lines?"
	  ○ "Are there any holes or parts of the grid that are missing?"
	  ○ "Are all the small squares equal in size?"
	  ○ "Do you see anything else (e.g. colours, tints)?"
	• Cover the right eye and repeat for the left eye.

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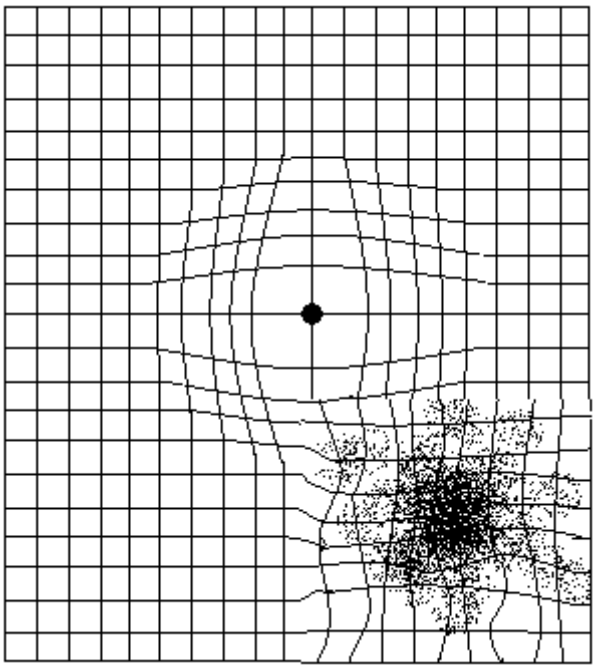
WHAT DOES IT MEAN?	• If any part of the grid appears blurred, wavy, distorted or missing, this indicates that the person has a problem with their macula • In this case, the person needs to be referred to an ophthalmologist or other eye care professional immediately • If a person was given the Amsler grid to monitor their own vision at home, they need to let their eye care practitioner know if they see any changes in how the Amsler grid looks.  ***Figure 23-2: How someone with a macular problem might see the Amsler grid***

HOW DO I RECORD THIS?	• If the person can see all four corners, and there are no missing or wavy lines:
	  ○ Record: Amsler Grid: Clear – no distortion
	• If the person cannot see a corner or sees wavy, distorted or missing lines:
	  ○ Record which eye the defect was in and describe the area of missing or wavy lines
	• Ask the person to draw on the grid which part of the grid is missing, or looks distorted or wavy.

REFERRAL CRITERIA	• Immediately refer the person to an ophthalmologist or other eye care professional if there are any missing or wavy lines on the Amsler grid.

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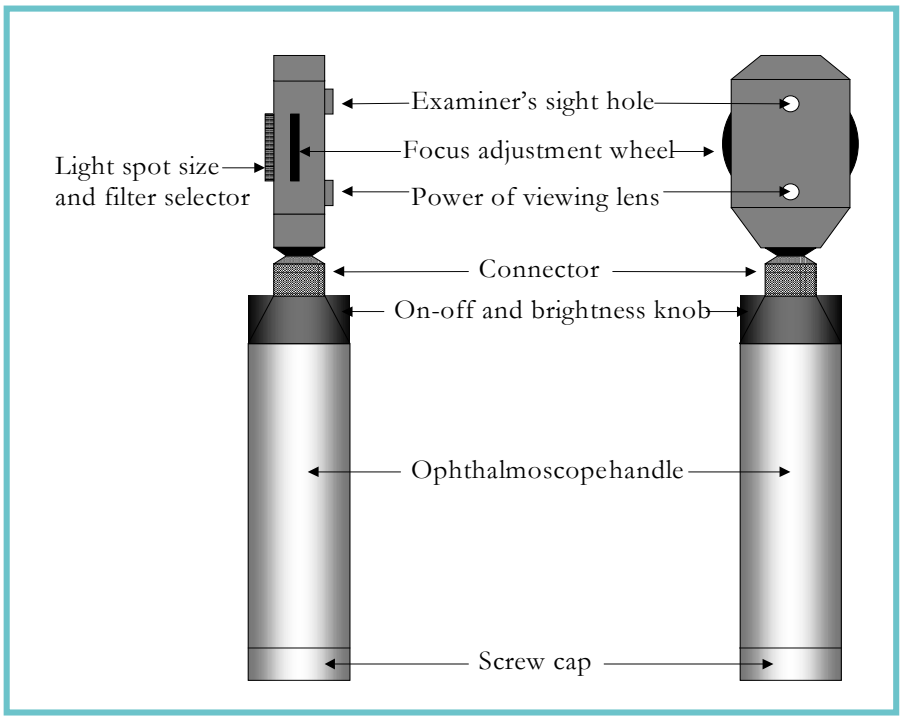
DIRECT OPHTHALMOSCOPY

WHAT IS IT?	• An ophthalmoscope is an instrument that can help us to examine the inside of the eye
	• We need to examine the inside of the eye to see if it is healthy
	• Ophthalmoscopy allows us to look at the lens, vitreous, optic nerve and part of the retina
	• There are a number of different types of ophthalmoscopes
	• In this unit, we will look at the monocular direct ophthalmoscope
	  ○ Monocular → only one eye is used to look through the instrument
	  ○ Direct → no lens is needed to view the back of the eye (if there is no refractive error present).

PARTS	 ***Figure 23-3: Parts of a monocular direct ophthalmoscope*** • Examiner's sight hole: → where you look through the instrument to look inside a person's eye • Focus adjustment wheel: → used to get a clear view of the part of the eye you want to examine → contains plus and minus lenses, as well as a plano lens (no power) → the power of the viewing lens is shown on the ophthalmoscope • Light spot size and filter selector: → to adjust the amount of light that enters the eye (if a person has small pupils, it is often better to use a smaller spot of light) → can change from white light to green light (green light is very useful to look at haemorrhages inside the eye) • On-off and brightness control knob: → used to change the brightness of the light used to examine the eye (light

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must be bright enough to allow you to see what is inside the eye, but not too bright as that will hurt the person's eyes)
→ this knob is also used to turn the ophthalmoscope on and off (it is important to always turn off the instrument when not in use, to save the battery power)

- The instrument handle:
  → contains the batteries that give power to the instrument
  → to remove and replace the batteries, you simply undo the screw cap at the bottom of the ophthalmoscope handle
  → some ophthalmoscopes use rechargeable batteries or mains-powered transformers rather than conventional batteries.

WHAT SHOULD I DO?

Preparation

- Ophthalmoscopy should be done in dim light (if possible)
- Warn the person that the light will be quite bright and that you will have to get very close to them, but that you will not touch their eyes
- Both you and the person should take your spectacles off (unless the refractive error is high)
- Get the person to look at an object slightly up and nasal to centre
- Using the focus adjustment wheel, set the dioptre adjustment to +10.00 D
- If you look at a person's right eye, hold the ophthalmoscope in your right hand, and put your right eye to the eyepiece.

Figure 23-4: The examiner uses her right eye to perform monocular direct ophthalmoscopy on the person's right eye

WHAT SHOULD I DO?

Media

- Look at the eye through the ophthalmoscope from a distance of about 10 to12 cm
- You will see a red glow through the pupil
  → this is called the red fundus reflex (or simply red reflex)
  → the red reflex is caused by the light being reflected off the retina
- The red reflex provides an excellent way of detecting opacities in the ocular media
  → the red reflex should be uniform and clear
  → there should be no dark patches or irregularity (this would indicate opacity of the cornea, the anterior chamber or the vitreous)
  → the brightness of the red reflex should be the same in the two eyes.

Retina

- Now you need to get slowly closer to the person, whilst turning the dioptre adjustment back towards 0.00
- As you gradually move closer and reduce the lens power, focus on the crystalline lens and the vitreous → these should both be clear, with no dark patches
- Finally you will focus on the fundus at the back of the eye (includes the retina, optic disc and retinal blood vessels)
- The power of the lens necessary to focus on the fundus will depend on the refractive error of the person as well as that of the examiner
- You will need to get very close to the person to get a good view of the fundus → the hand that is holding the ophthalmoscope to your eye should be touching the person's cheek
- When the retina comes into focus (don't worry if the dioptre adjustment does not read 0.00), look for a blood vessel
- Trace this blood vessel towards the optic disc → where the optic nerve enters the eye.

Figure 23-5: To look at the posterior eye, and eventually focus on the fundus, the examiner needs to move much closer to the person

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Optic Disc

- Look at the colour of the disc:
  → it should be orange/yellow or pink
  → it should not be white or pale
- Look at the disc margins:
  → these should be easily seen, and should not be blurry
  → blurry margins could indicate swelling of the disc (papilloedema)
  → note the presence of any pigment around the disc
  → there may be an arc of pigment around the disc, or an arc of white on the temporal side of the disc → this is called a scleral crescent
- Note the shape of the disc:
  → it should be round, not oval
- Look at the optic cup:
  → this is the yellow circle at the centre of the disc
  → the cup may have a grey area in the middle (called the lamina cribrosa)
  → it should be completely surrounded by optic disc tissue
- Compare the size of the optic cup to the bigger optic disc:
  → this is called the cup to disc (CD) ratio
  → it should be about 0.3 (the optic cup should be 1/3 the size of the optic disc).

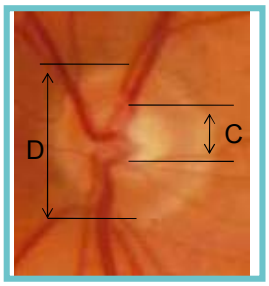

Figure 23-6: C:D ratio
[photo courtesy of Richard Leung/Kings College Hospital: ICEH]

Blood Vessels

- From the optic disc, follow the blood vessels in each quadrant
- Look at the arteries:
  → these are quite pale and thin (thinner than the veins)
  → they bring oxygenated blood from the heart
  → there should be a bright light reflex coming from the centre of the arteries
  → the arteries should be about 2/3 the size of the veins (AV ratio 2:3)
  → if the arteries are much smaller than the veins, this could indicate that the person has high blood pressure
- Look at the veins:
  → these are the dark red blood vessels
  → veins are relatively large
  → they return blood to the heart for re-oxygenation
- Look also at the places where the veins and arteries cross:
  → there should be no narrowing of the veins at the crossings
  → the arteries should not compress the veins (this can be a sign of high blood pressure).

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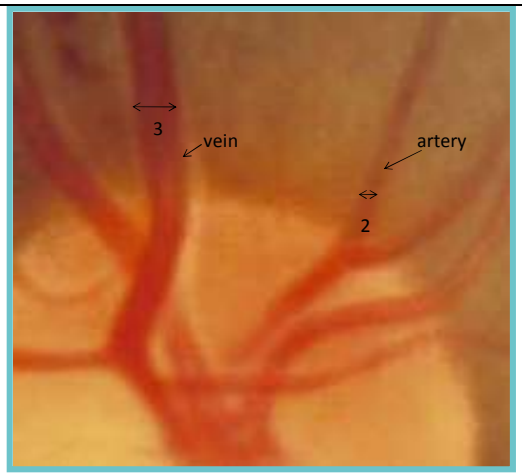

Figure 23-7: AV ratio (2:3)
[photo courtesy of Richard Bourne: ICEH]

Peripheral Fundus

- Look at the rest of the fundus, including the periphery (as far as what the direct ophthalmoscope and small pupil allow you to see)
- Ask the person to look in different directions → so that you can see different parts of the retina
- You may need to adjust the dioptre focusing wheel to keep the retina in focus
- The colour of the fundus can vary, depending on the race of the person
- Look for haemorrhages (bleeding or leakage of retinal blood vessels)
- Look for pigment, white spots (cotton wool spots), blood (haemorrhages).

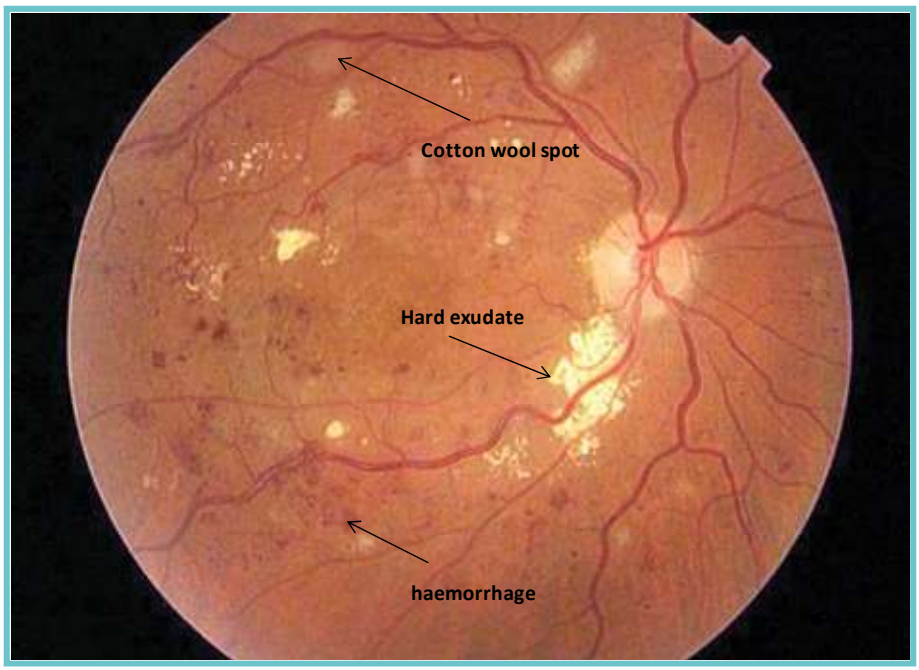

Figure 23-8: Cotton wool spots, hard exudates and haemorrhages
[photo courtesy of David Yorsten: ICEH]

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Macula

- The macula is the part of the retina between the superior and inferior blood vessels
- From the disc, move the light about two disc diameters temporally (away from the person's nose)
- Use the smallest spot of light possible to make it more comfortable for the person
- Note whether the macula is clear, or if there are any yellow accumulations (drusen), pigmentation or depigmentation, oedema, or any other signs of age-related macular degeneration (ARMD)
- The centre of the macula is the fovea → note whether there is a foveal reflex.

HOW DO I RECORD THIS?

Right Eye		**Left Eye**
Clear	**Media**	Clear
0.3	**C:D ratio**	0.3
Yellow/orange	**Disc Colour**	Yellow/orange
Distinct	**Disc Margins**	Distinct
AV ratio 2:3	**Blood Vessels**	AV ratio 2:3
Clear	**Macula**	Mottled appearance
Clear	**Fundus**	Clear

REFERRAL CRITERIA

The person needs to be referred if:

- There are cataracts or opacities in the lens or other ocular media
- You see haemorrhages on the retina or at the back of the eye
- There are pigment changes on the retina or macula
- There are white spots (cotton wool spots) on the retina
- The cup:disc ratio is large
- The optic nerve looks pale and/or swollen
- The A/V ratio is less than 2:3
- Any of the arteries seem to be compressing any of the veins
- You are unsure whether something you see is normal.

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SUMMARY – CLINICAL TECHNIQUES: POSTERIOR EYE

AMSLER GRID

- The Amsler grid lets us assess a person's central visual field
- If a person sees wavy or missing lines on the grid, this may indicate a macular disease (such as macular degeneration)
- Any person suspected of having macular disease should be referred.

DIRECT OPHTHALMOSCOPY

- Direct ophthalmoscopy is a way to look at the posterior eye
- We can use it to look at the lens, vitreous, optic nerve and part of the retina
- If you are unsure about something you see, you should refer the person.

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TEST YOURSELF QUESTIONS

1. **How does one conduct an Amsler grid test?**

   _____

   _____

2. **A person has age related macular degeneration. What might they report when looking at the Amsler grid?**

   _____

   _____

3. **Which parts of the eye can you examine with a direct monocular ophthalmoscope?**

   _____

   _____

   _____

4. **What do we mean by cup:disc ratio, and what is the normal C:D ratio?**

   _____

   _____

5. **What is the normal A:V (artery:vein) ratio for retinal blood vessels?**

   _____

6. **During ophthalmoscopy, you notice that a person's retinal arteries are compressing the retinal veins. What could be the cause of this, and what should you do?**

   _____

   _____

   _____

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