check

Independent learning program for GPs

Unit 582
May 2021

Ophthalmology

RACGP

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We acknowledge the Traditional Custodians of the lands and seas on which we work and live, and pay our respects to Elders, past, present and future.

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Ophthalmology

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The five domains of general practice

- Communication skills and the patient–doctor relationship
- Applied professional knowledge and skills
- Population health and the context of general practice
- Professional and ethical role
- Organisational and legal dimensions

RACGP

NEW CPD for GPs

Macular Disease Foundation Australia is launching FREE CPD courses that have received RACGP accreditation.

In collaboration with RANZCO and Australia's leading retinal specialists, including world-renowned ophthalmologist Professor Paul Mitchell AO, MDFA has developed two courses launching in late 2021.

Program 1: Age-related macular degeneration

Program 2: Diabetic eye disease

Funded by the Federal Government, these courses aim to improve patient communication about macular disease and its impacts, manage and reduce modifiable risk, ensure high-risk individuals have regular eye examinations, and link people diagnosed with macular disease with appropriate supports and services.

Access this free CPD through RACGP from late 2021.

www.mdfoundation.com.au/im-a-health-professional

Macular Disease Foundation AUSTRALIA

About this activity

General practice surgeries are the first point of contact for many patients presenting with visual disturbances. Approximately 2.2% of general practice consultations are eye related, and 4.8% of medical specialist referrals are to an ophthalmologist.[1] It is important to be able to ascertain the urgency of presentations and differentiate between sight-threatening and non–sight threatening conditions, as well as identify patients at risk of common conditions to enable the commencement of appropriate screening and preventive strategies.

In Australia, the most common cause of irreversible vision loss in patients aged >50 years is age-related macular degeneration.[2] Approximately one in seven individuals is affected, and prevalence is expected to rise.[2]

Diabetic retinopathy affects 29.1% of Australians with diabetes aged >40 years, with the most common type being non-proliferative diabetic retinopathy.[3]

Results from the Australian National Eye Health Survey indicated that the prevalence of probable or definite glaucoma in non-Indigenous Australians aged <50 years was 3.9% for males and 3.0% for females, equivalent to almost 200,000 non-Indigenous Australians.[4] Prevalence was lower in Aboriginal and Torres Strait Islander Australians (1.8% of males and 1.5% of females).[4]

Elderly patients may present with flashes and floaters in their vision. The most common cause for this presentation is posterior vitreous detachment, which is present in approximately 66% of patients aged >70 years.[5]

In children, a common disorder of ocular alignment is strabismus. Early detection and treatment of this condition, which affects 2–4% of children, can prevent the development of amblyopia.[6]

The incidence of uveitis in Australia is unknown; however, a recent study identified an incidence of 21.54 per 100,000 person-years and a period prevalence of 36.27 per 100,000 persons in greater Melbourne, which may be representative of urban Australia.[7]

Although microbial keratitis is rare, with an incidence of approximately 0.66 cases per 10,000 people,[8] it is a potentially severe sight-threatening condition that should not be overlooked. The prevalence is higher in individuals who wear contact lenses, with 2–5 per 10,000 wearers per year affected.[9]

This edition of *check* considers the investigation and management of eye disease in general practice.

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Learning outcomes

At the end of this activity, participants will be able to:

- outline the recommendations for referral to an ophthalmologist for various presentations, including diabetic retinopathy and flashes and floaters
- identify the features on presentation that differentiate between different causes of red eye, including microbial keratitis and uveitis
- describe the signs or symptoms that would suggest a patient has developed advanced macular degeneration
- discuss the first-line treatment of glaucoma
- outline the factors a practitioner would consider when deciding whether a patient has pseudostrabismus or strabismus.

Authors

Case 1

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Case 4

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Case 7

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Abbreviations

AMD	age-related macular degeneration
AREDS	Age-Related Eye Disease Studies
BCVA	best corrected visual acuity
FFA	fundus fluorescein angiography
GP	general practitioner
HLA-B27	human leukocyte antigen B27
HSV	herpes simplex virus
IOP	intraocular pressure
NPDR	non-proliferative diabetic retinopathy
OCT	optical coherence tomography
PCR	polymerase chain reaction
PDR	proliferative diabetic retinopathy
PRP	panretinal photocoagulation
PVD	posterior vitreous detachment
RACGP	The Royal Australian College of General Practitioners
RANZCO	The Royal Australian and New Zealand College of Ophthalmologists
SLT	selective laser trabeculoplasty
URTI	upper respiratory tract infection
VEGF	vascular endothelial growth factor
VZV	varicella-zoster virus

CASE

1 Christina has seen her optometrist and is concerned

Christina, aged 72 years, is a Greek retiree. She is asymptomatic, but at a routine optometry review her optometrist told her that she has macular degeneration and needs to take nutritional supplements to stop her going blind.

A review of Christina's medical record identifies risk factors for macular degeneration including hypertension, dyslipidaemia, cigarette smoking, family history of macular degeneration and Northern European/Greek ancestry.

Christina is very upset and wants to know what she should do.

Question 1

How would you approach the consultation?

Further information

Christina is medically well. Her systemic hypertension and hypercholesterolaemia are well controlled with telmisartan, lercanidipine and rosuvastatin. She states she is cutting down but currently smokes 10 cigarettes per day. Her sister has macular degeneration and is receiving treatment with 'needles into the eye'. Visual acuity is 6/6 in both eyes. Fundoscopy shows drusen and pigment clumping in both maculae (Figures 1A and 1B). Christina provides you with copies of retinal optical coherence tomography (OCT) scanning supplied by her optometrist (Figures 1C and 1D).

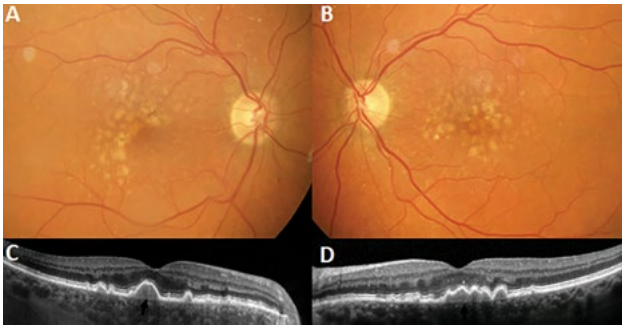

Figure 1. Colour fundus photographs of Christina's right (A) and left (B) eyes showing small drusen, large drusen and pigment clumping in both eyes. Optical coherence tomographic scanning of the right (C) and left (D) eyes showing multiple drusen located beneath the retinal pigment epithelium in both eyes.

Question 2

What is your advice to Christina?

Further information

You tell Christina that you agree with the diagnosis of age-related macular degeneration (AMD). Based on incidental findings during a routine optometry examination, lack of symptoms, good vision in both eyes and fundus examination demonstrating drusen without retinal haemorrhages or scarring, you agree that the AMD appears to be of the early-to-intermediate 'dry' type. Her sister probably has neovascular AMD being treated with intravitreal anti–vascular endothelial growth factor (VEGF) agents.[1]

For Christina, who has drusen and pigment clumping in both eyes, the risk of development of advanced AMD in at least one eye over the next five years is approximately 50%.[2] You reassure Christina that she has dry AMD and a low risk of sudden blindness, and that treatments for wet AMD are very effective.[3] You warn Christina that a sudden change in her central vision in one or both eyes could represent the development of neovascular AMD, and recommend prompt attendance within a few days with her optometrist if this occurs.

Question 3

Are there any lifestyle modifications that can slow the progression of AMD?

Further information

Christina returns three years later requesting a recommendation for a 'good optometrist'.

Christina has been having difficulty reading. Prior to that, she was asymptomatic and did not attend for regular optometric reviews as you had recommended. She continues to smoke cigarettes.

Question 4

How would you approach the consultation?

Further information

Christina's symptoms are restricted to the right eye, which has had blurred vision and distorted vision (metamorphopsia) for six weeks. Visual acuity is 6/7.5 in the right eye and 6/6 in the left eye. Fundoscopy is unchanged from three years earlier, with no retinal haemorrhage seen.

Question 5

What is your management plan?

Further information

Several days later, you receive a report from Christina's ophthalmologist, who diagnosed bilateral neovascular AMD and commenced bilateral treatment with aflibercept, a VEGF antagonist, administered by intravitreal injection. The ophthalmologist recommends an inject-and-extend regimen, with loading doses administered four-weekly until the neovascular lesion is quiescent (typically three doses), followed by gradual prolongation of the intertreatment interval dependent on disease activity. Injection interval varies between and within individuals but can in some patients be extended to as long as 16 weeks. The report includes a copy of OCT scanning confirming the diagnosis (Figures 2A and 2B).

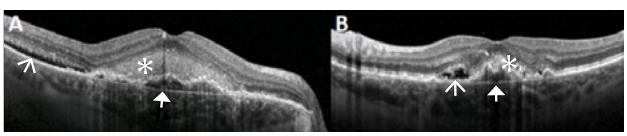

Figure 2. Optical coherence tomographic scanning of the right (A) and left (B) eyes showing drusen beneath the retinal pigment epithelium (bold arrow), subretinal fluid (light arrow) and subretinal hyper-reflectant material (asterisk) in both eyes.

Christina attends two years later requesting cessation of eye injections. She is happy with her vision but thought she would be cured after two years of treatment. She does not understand why she is continuing to have injections in both eyes every 12 weeks, particularly as she has stopped cigarette smoking.

Question 6

What is your advice?

Further information

You counsel Christina to continue treatment while she continues to benefit from it and to continue the diet thought to slow AMD. You congratulate her on ceasing smoking. You recommend she consider joining her relevant patient support group, Macular Disease Foundation Australia, and SmartSight patient support program if it is offered in her area.

Christina attends five years later and is concerned that treatment to the right eye was ceased. She has continued anti-VEGF treatment for the past seven years since diagnosis of bilateral neovascular AMD. However, she has noted a reduction in vision in the right eye, and aflibercept treatment to the right eye was ceased by her ophthalmologist at the most recent visit. Treatment to the left eye continues, but the interval has been reduced to four weeks. Christina is very concerned that she has stopped treatment and requests you to sign a Centrelink application form for a disability pension.

Question 7

What are the goals of this consultation?

Further information

Christina's visual acuity is <6/60 in the right eye and 6/12 in the left eye. Fundoscopy shows right macular subretinal fibrosis and atrophy, with no haemorrhage in either eye (Figure 3).

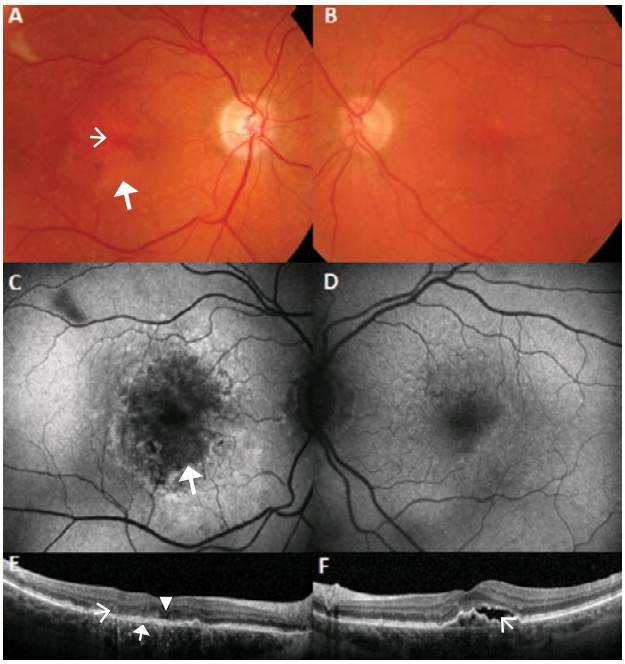

Figure 3. Colour fundus photographs showing in the right eye (A) subretinal fibrosis at the site of a treated neovascular lesion (bold arrow) and adjacent macular atrophy (light arrow), and in the left eye (B) resorption of drusen. Fundus autofluorescence images of the right eye (C) showing focal macular hypo- and hyperautofluorescence (bold arrow), with minor changes only in the left eye (D). Optical coherence tomographic scanning of both eyes showing in the right eye (E) disorganisation within the outer retinal layers (bold arrow), with outer retinal tubulation (light arrow) and nascent macular atrophy (arrowhead), and in the left eye (D) relative preservation of outer retinal layer integrity, with overlying subretinal fluid (light arrow).

Question 8

What is your management plan?

CASE 1 Answers

Answer 1

The aims of the consultation are to confirm the optometric diagnosis of AMD, assess Christina's stage of disease, and educate Christina on modifiable risk factors and the role of self-monitoring of symptoms of disease progression.

Further history-taking would include enquiring regarding her ophthalmic history and lifestyle factors such as diet, exercise and cigarette smoking. Examination would include measuring vision in both eyes best corrected (wearing distance glasses) and examining the fundi by direct ophthalmoscopy through non-dilated pupils. Amsler grid testing (Figure 4) of each eye can identify central scotoma or distortion that can suggest neovascular AMD or advanced AMD.

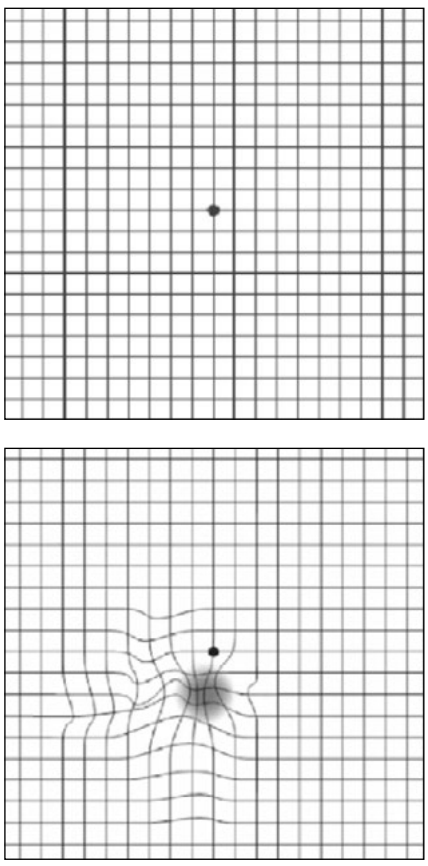

Figure 4. Amsler grid testing

A. Normal macular function; **B.** A small scotoma with distortion inferior to fixation in a patient with age-related macular degeneration

Figure reproduced from Broadway DC, Visual field testing for glaucoma – A practical guide, Community Eye Health 2012:25(79–80):66–70, licence at https://creativecommons.org/licenses/by-nc/3.0/au

Answer 2

It is not reasonable to expect general practitioners to make the first diagnosis of AMD and its subtypes, but an understanding of the condition is important to ensure best-practice management.

AMD is a painless, bilateral condition that may lead to slow visual loss of central vision required for reading, driving and recognising faces. It is the leading cause of blindness of patients aged >65 years. The majority of patients initially present with typical drusen, accumulations of debris beneath the retinal pigment epithelium (early 'dry' AMD). Over time, drusen resorb, with development of atrophy of the photoreceptors and retinal pigment epithelium ('geographic atrophy' or advanced 'dry' AMD). Some patients develop the complication of new blood vessels from the underlying choroid invading the retina (neovascular or 'wet' AMD), a complex process driven in part by VEGF. Previous studies have shown neovascular AMD to be responsible for up to 90% of blindness due to AMD.[4,5]

Answer 3

Modifiable risk factors to slow the progression of AMD are lifestyle based, and patients are recommended to adopt a diet rich in fish containing omega-3 fatty acids and dark green leafy vegetables,[6] and to cease cigarette smoking, as this increases the risk of progression to choroidal neovascularisation by up to 20 times.[7,8] It is important to explain the risk cigarette smoking is generating and recommend support services for smoking cessation.

The role of nutritional supplements is controversial. The Age-Related Eye Disease Studies (AREDS and AREDS2) of supplementation with vitamin C 500 mg, vitamin E 400 IU, lutein 10 mg, zeaxanthin 2 mg, zinc oxide 80 mg and copper 2 mg (to prevent copper-deficiency anaemia associated with zinc intake) showed marginal slowing in progression of AMD in patients with advanced stages of AMD. Lutein and zeaxanthin are safe for smokers; beta-carotene in earlier formulations was associated with lung cancer in former and current smokers.[9] At earlier stages of AMD, there is no evidence that nutritional supplementation with AREDS supplements will alter disease progression.[10] As Christina has early-to-intermediate AMD, the evidence for nutritional supplementation is weak. Studies have also demonstrated no benefit of omega-3 fatty acid fish oil capsule supplementation in slowing AMD progression; this is not an alternative to a diet rich in fish.[11]

Annual optometric review is recommended. Patients are best advised to regularly self-monitor their vision by closing each eye alternately while viewing a near target, or using an Amsler grid if this has been provided. Amsler grids can be downloaded online or obtained from the Macular Disease Foundation Australia. They can be placed on the fridge, or used as a mobile phone app, and the patient can compare their eyes regularly to check for a change in their central vision.

Answer 4

Patients with known dry macular degeneration who have experienced a sudden drop in vision are at risk of development of neovascular AMD. Relevant history includes, for each eye separately, symptoms of blurring and/or metamorphopsia and estimated duration. Examination would include measuring best corrected visual acuity and direct fundoscopy through non-dilated pupils.

Answer 5

Given the short duration of symptoms, it would be recommended to refer Christina for urgent ophthalmology consultation to rule out neovascular AMD in the right eye. It would also be important to reiterate the risk cigarette smoking is generating regarding progression of her known AMD and recommend support services for smoking cessation.

Answer 6

Rates of non-adherence and non-persistence with anti-VEGF treatment are recognised to be high, with non-persistence estimated to be up to 50% by 24 months.[12] More than 80% of patients do not understand that neovascular AMD is a chronic disease, and more than 60% expect treatment to decrease or stop over time.[13] Other factors may include older age, living at distance from the clinic and unilateral disease.[14] Some factors are not able to be altered (eg patient age), but education and patient support programs may be helpful in reducing non-persistence.

It is advised to counsel patients and their families that neovascular AMD is a chronic, incurable condition and that ongoing intravitreal therapy with anti-VEGF agents is standard care for wet AMD.[15] Untreated, central vision is lost, over a period of typically two years.[15] An inject-and-extend regimen, which Christina is receiving, is the preferred treatment pattern in Australia as it is proactive and intentionally lengthens the intertreatment interval to the longest possible, based on disease activity. Treatment is personalised; however, some patients prefer to attend 4–6-weekly and receive treatment as necessary.[16]

Answer 7

The goals of the consultation are to measure the vision, determine the reason for stopping treatment and establish the level of disability. Consultation will include history of vision loss and questions about activities of daily living such as reading and driving. Examination will include measurement of vision and direct fundoscopy.

Answer 8

Long-term loss of vision, despite optimal anti-VEGF treatment, is not unusual. Registry data from Australian patients treated for neovascular AMD show loss of 10 or more letters in vision (two lines on a Snellen chart) in 32% of patients who continued treatment for >6.5 years.

Loss of vision was due to central geographic atrophy in 37% of patients and subretinal fibrosis (scarring) in 31%.[17]

It is recommended to counsel Christina that discontinuing treatment in the right eye is the appropriate decision, as further treatment would be futile given the poor visual acuity and macular atrophy. It is also advised to encourage Christina to follow the ophthalmologist's plan to continue treatment to the left eye, as the rate of vision loss will be slower with continued treatment than the natural history. Treatment is personalised depending on disease activity, and it is appropriate to increase treatment frequency if dictated by disease activity.

As Christina is not legally blind, you are not able to sign a Centrelink form stating this. It is recommended to advise Christina that at present she is within Austroads visual requirement to hold a private driving license, but this requires ongoing review.

Resources for patients

- Macular Disease Foundation Australia, www.mdfoundation.com.au/content/macular-disease-3
- Retina Australia, www.retinaaustralia.com.au
- Vision Australia, www.visionaustralia.org
- Bayer – SmartSight patient support program, telephone 1800 460 150

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CASE

2 Hye-yoon is seeing dots

Hye-yoon is an independent woman, aged 72 years, who previously worked as a nurse. She was brought into your surgery by her daughter with a complaint of seeing dots in her vision. Hye-yoon lives on her own, drives herself and helps care for her grandchildren while her daughter works. She has a background of well-controlled type 2 diabetes and wears glasses for myopia.

Question 1

What further questions would you ask Hye-yoon to assist in making a diagnosis?

Further information

Hye-yoon states that she first noticed the dots in her vision 3–4 days ago. The dots appeared gradually over the day and were few in number. Hye-yoon describes the dots as 'fine' and 'cobweb-like' and says they float across her vision. Since the dots first appeared, they have remained unchanged in number and appearance. She states they come and go; however, the dots do not fully disappear. Hye-yoon feels the floating dots are only in her right eye, although she reluctantly mentions she has noticed occasional flashes of light in her right eye as well, particularly at night. She does not report any distorted or blurry vision and has not noticed a veil or curtain coming across her vision.

Hye-yoon has not had any associated headaches, nausea, vomiting or retro-orbital pain, and there is no history of trauma.

Hye-yoon admits she often experiences migraines and initially thought her current symptoms were an aura preceding her migraine. However, she realised that 'this time is different' when her usual remedies did not relieve the symptoms. Aside from her diabetes, for which she takes metformin, Hye-yoon is managing her hypertension with perindopril.

Hye-yoon has worn glasses for myopia for as long as she can remember. Hye-yoon does not smoke or drink alcohol, nor does she recall any family history of significant eye disease.

Hye-yoon drives regularly and has an unrestricted driver's licence. She assists her daughter by caring for her grandchildren three days per week. Hye-yoon has been concerned about driving since the floating dots came into her vision.

Question 2

What further assessments would be useful in differentiating Hye-yoon's presentation?

Further information

Hye-yoon's vital signs are within normal limits, and she is afebrile. She is oriented to person, place and time.

Hye-yoon's visual acuity is 6/9 corrected with glasses and 6/6 with pinhole in both eyes. She has no visual field loss, and her pupils are equal and reactive to light with no relative afferent pupillary defect.

Using direct ophthalmoscopy, Hye-yoon has a red reflex present in both eyes, and you are unable to fully view the fundus; however, you do not note any large haemorrhages or notable retinal detachments.

Question 3

Would you order any urgent investigations?

Question 4

What are your working and differential diagnoses?

Further information

Hye-yoon expresses anxiety about the dots she is seeing and asks you what you think is happening and whether she should be worried about losing her driver's licence.

Question 5

What risk factors does Hye-yoon have for retinal detachment?

Question 6

How would you explain to Hye-yoon what flashes and floaters are?

Question 7

What advice would you provide to Hye-yoon about driving?

Question 8

Would you urgently refer Hye-yoon to a specialist?

CASE 2 Answers

Answer 1

Flashes and floaters are a common ocular presentation in the ageing population. It is important to take a detailed history and identify any risk factors present. The presence of flashes and floaters can range from benign to sight threatening and urgent and can be separated into ophthalmic and non-ophthalmic causes, as well as acute onset versus chronic (present for months/years). History-taking should be focused on further defining onset, duration and associated symptoms. Changes in visual acuity or visual fields, retro-orbital pain and blurriness are important symptoms to discuss.[1–3] Additional symptoms such as dizziness, headaches, nausea or vomiting should also be asked about.[1,4] Previous ophthalmic, family and social history should be discussed, particularly if the patient is not known to the practice.

Answer 2

Examination in the primary care setting should involve vital signs, including temperature, blood pressure, heart rate, respiratory rate and oxygen saturation.

Visual acuity should be performed using a Snellen or LogMAR acuity chart at the appropriate distance. It is important to record the patient's best corrected visual acuity with glasses/contact lenses and pinhole. Visual field to confrontation can be used to elicit visual field defects that may provide clues to the location of a retinal detachment. Pupil size and reaction to light should be measured, along with checking for a relative afferent pupillary defect. Extraocular muscle movements can be observed for pain on movements, nystagmus and diplopia.

Fluorescein drops can be used to stain the cornea if there is any concern about a corneal foreign body. The direct ophthalmoscope provides a magnified, upright and real image of the fundus, albeit a small field of view.[5] Widefield retinal viewing using the PanOptic Ophthalmoscope can provide a five times larger field of view.

In the primary care setting, the general practitioner (GP) can check for the presence of a red reflex and attempt to view haemorrhages or detachments. Pupil dilation using tropicamide 1% or cyclopentolate 1% would be ideal.[1,2]

Answer 3

Few investigations will be of assistance in the acute setting; however, monitoring of Hye-yoon's diabetes including blood glucose level and glycated haemoglobin should be considered to optimise diabetic control in the long term.

Answer 4

The first step to differentiating diagnoses with the presentation of flashes and floaters is to separate into ophthalmic and non-ophthalmic conditions. It is important to note that patients such as Hye-yoon may present with both flashes and floaters, while others may describe only one of these symptoms.

Table 1 provides a broad range of differential diagnoses to consider in any patient presenting with either flashes or floaters, or both. In Hye-yoon's case, the differential diagnoses listed under the column 'Both flashes and floaters' should yield high suspicion given her presentation. Further down the list of differentials, one might consider migraine aura and postural hypotension, albeit less likely.[1–4,6–9]

Answer 5

The incidence of retinal detachment is approximately one in 10,000 and is 5–6 times higher in patients with high myopia (ie more than –5.00 dioptres).[2,10,11] Other risk factors include blunt and penetrating eye trauma, complicated cataract surgery, intraocular inflammation, previous retinal detachment surgery in either eye, age >50 years, and a family history of retinal detachment (eg Stickler syndrome).[2,4,12]

Hye-yoon presented with multiple risk factors, including myopia and age >50 years.

Additionally, patients with type 2 diabetes are at risk of developing proliferative diabetic retinopathy, in which retinal bleeding can lead to vitreous haemorrhage, potentially mimicking the presentation for posterior vitreous detachment (PVD) and increasing the risk for retinal detachment.[2,13]

Answer 6

Floaters are clumps of the vitreous jelly that appear as small dots or 'cobwebs' in the visual axis.[6] A PVD is a common occurrence due to age liquefaction of the vitreous (syneresis), causing vitreous floaters.[4,7,9] On examination, often a circular floater (Weiss ring) is seen.[4,7,9] Flashes are often described as 'lightning streaks' and are associated with vitreous traction, occurring as the vitreous separates from the retina due to the syneresis.[4,7,9] Additional small floaters, such as spots in vision, may be due to vitreous haemorrhage resulting from the PVD causing a retinal capillary avulsion.[7,9] The symptoms may also occur with a retinal tear or, less commonly, with a retinal hole.[7,9] Differentiation would be made on ophthalmoscopic examination of the retina to determine the cause. Flashes that resolve, are minimal or only occur at night may be less likely to be a retinal tear, for which the flashes would be more acute, persistent and non-resolving, and particularly noticeable during the day and night.[2,9]

For a retinal detachment, loss of vision is often noticed at the onset with peripheral field loss as a 'curtain coming over effect'.[2,7] Flashes and floaters as described above may precede the onset of a retinal detachment.

Answer 7

Hye-yoon expressed concern about driving as it is an important aspect of her independence.

Table 1. Differential diagnoses of flashes and floaters[1–4,6–9]

	Ophthalmic		Non-ophthalmic
Flashes	**Floaters**	**Both flashes and floaters**	**Less likely diagnoses**
• Vitreous traction • Retinal tear • Rapid eye movement in darkness • Oculodigital stimulation • Optic neuropathy • Retinitis	• Posterior vitreous detachment • Vitreous syneresis • Vitritis • Vitreous haemorrhage • Retinal detachment • Hyphaema or microhyphaema • Corneal opacity or foreign body	• Posterior vitreous detachment • Retinal tear or hole • Retinal detachment • Posterior uveitis	• Migraine aura • Hallucinations • Postural hypotension • Vestibulobasilar artery insufficiency • Occipital lobe disorders • Giant cell arteritis

Driving restrictions vary for private and commercial vehicle drivers, as well as unconditional and conditional licences.[14] Flashes and floaters are not a contraindication for driving. However, if their presence is interfering with one's vision, driving is not recommended. Government guidelines for medically assessing fitness to drive can be found through Austroads (refer to Resources for doctors).[14]

Answer 8

Hye-yoon's presentation of acute-onset flashes and floaters warrants referral to an ophthalmologist for a dilated fundus examination. Referral would be more urgent if there was reduced visual acuity, visual field loss or history of a curtain- or shadow-like appearance across the patient's visual axis.

In general, dots in vision for a few days requires a semi-urgent (within a week) referral if vision is normal and without flashes. If there is vision loss, then urgent (within 24 hours) referral and keeping the patient nil by mouth is recommended if possible. If there are recent flashes (and floaters, but no vision loss) that only present occasionally, then semi-urgent referral is recommended. Recent and persistent flashes that do not resolve require more urgent referral, within 24 hours if possible. Chronic flashes and floaters with no loss of vision can be managed with a routine referral.

Safety netting advice for Hye-yoon, particularly if she is unable to see an ophthalmologist that day, would involve education on symptoms to look out for, and when to seek urgent medical advice. Such symptoms would include an increase in frequency of flashes, as well as flashes becoming persistent and not self-resolving. An increase in the number or size of floaters, any loss of vision, or the appearance of a curtain coming across, down or up within the visual axis could all indicate a retinal tear or detachment and would require urgent review by an ophthalmologist. If a local ophthalmologist is not available, then urgent referral to the nearest hospital with on-call ophthalmology services would be recommended.

Conclusion

You refer Hye-yoon to an ophthalmologist for further assessment. Hye-yoon receives a following-day referral to a local ophthalmologist. She has a full ophthalmological assessment and fundus exam, which reveals a right PVD. Hye-yoon is given information about flashes and floaters and signs to watch out for, such as progression or exacerbation of symptoms, and vision loss. She agrees to notify any changes early, schedule routine follow-up with her ophthalmologist, as well as her optometrist for refraction, and to see her GP for ongoing diabetes care.

Summary

Flashes and floaters, while typically benign, may indicate a sight-threatening condition in a small percentage of patients. Hye-yoon presented with multiple risk factors for retinal detachment. Early referral to ophthalmology for a dilated fundus examination is recommended to ensure timely appropriate intervention.

Resources for doctors

- Australian Road and Transport Guidelines – Assessing fitness to drive, https://austroads.com.au/publications/assessing-fitness-to-drive/ap-g56

Resources for patients

- Royal Australian and New Zealand College of Ophthalmologists patient information – Flashes and floaters, https://ranzco.edu/home/policies-and-guidelines/patient-information/

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CASE

3 Mitsuishi's eye is irritated

Mitsuishi, aged 57 years, is a bookkeeper. She is bothered by a red, irritated left eye that has worsened over the past week. Mitsuishi's eye is weepy, and her vision is occasionally blurred. She also has a red upper and lower lid on the left.

Mitsuishi has primary open angle glaucoma and uses latanoprost/timoptol daily to both eyes, and brimonidine twice daily to the left eye. She has used this combination of drops for the past three months.

Question 1

What are the possible causes of her symptoms? What history and examination would be appropriate?

Further information

Mitsuishi does not report significant eye pain. Her vision is generally good, but the blurriness comes and goes on the left. She does not report nausea or vomiting, any other symptoms of a upper respiratory tract infection (URTI) or contacts with a red eye.

For the past five years, Mitsuishi's glaucoma has been stable and treated only with latanoprost/timoptol drops once daily to both eyes. However, three months ago when she saw her ophthalmologist, she was advised that the left intraocular pressure (IOP) was higher than ideal, and so brimonidine twice daily was commenced on the left.

On examination, Mitsuishi's visual acuity is 6/6 in the right eye and 6/7.5 in the left. Pupils are equal and reactive to light. On slit lamp examination, the left conjunctiva is inflamed with a visible follicular reaction (appearance of lumps similar to grains of rice; Figure 1). On instillation with fluorescein there is no staining of the cornea. The pupil margin appears round.

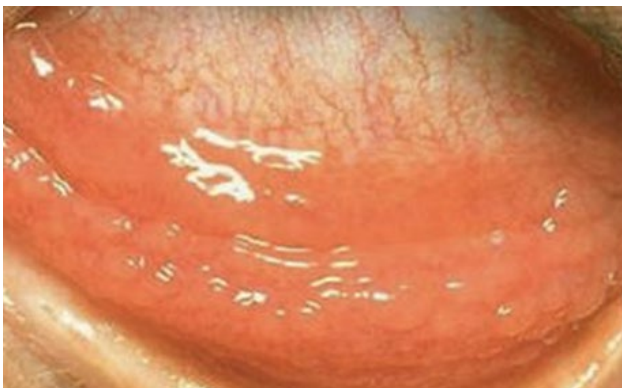

Figure 1. Follicular conjunctivitis

Question 2

What is the likely diagnosis, and what are the differential diagnoses?

Question 3

Are there any investigations that can be performed?

Question 4

Assuming this is a reaction to Mitsuishi's topical medication, what are the next steps?

Question 5

Why would her ophthalmologist have added brimonidine to her medication regimen at her last visit three months ago?

Question 6

What is likely to occur in Mitsuishi's case?

CASE 3 Answers

Answer 1

Beware the unilateral red eye. Serious causes include:

- acute angle closure crisis (characterised by intense eye pain, nausea/vomiting, a fixed dilated pupil)
- acute anterior uveitis (sometimes distortion of the pupil may be present)
- COVID-19 (which can present with symptoms of a viral conjunctivitis).[1]

More common causes include:

- corneal foreign body (history of wind exposure, steel work etc; the patient is often aware of when the foreign body entered)
- viral conjunctivitis (intact cornea, pre-auricular or submandibular tender lymphadenopathy, URTI symptoms and/or contacts with a red eye)
- bacterial conjunctivitis (mucopurulent discharge)
- corneal ulcer (apparent on fluorescein staining)
- marginal keratitis (corneal limbal inflammation related to dry eye syndrome).

However, in this case the presentation is most likely related to the topical glaucoma medication, either an intolerance or allergy that has developed to either the active ingredient or the preservative in the bottle. It is important to determine if there have been any changes to Mitsuishi's topical medication regimen.

History-taking would involve asking about specific symptoms of angle closure crisis, risk factors for viral conjunctivitis exposure or a foreign body, and potential COVID-19 exposure.

Examination would involve visual acuity, pupil reaction and slit lamp with fluorescein staining of the anterior segment.

Answer 2

The history and examination have ruled out acute angle closure crisis and a corneal epithelial defect or foreign body.

Provisional diagnosis

Allergic reaction to brimonidine

Allergy is a common cause of follicular conjunctivitis for people undergoing brimonidine treatment. It typically develops weeks/months following commencement of the topical agent. Brimonidine can cause a papillary or follicular conjunctivitis, and rarely a granulomatous anterior uveitis.[2,3]

Brimonidine is an α2 agonist commonly used to treat glaucoma by lowering aqueous production in the ciliary body. It is generally not used first line because of problems with tachyphylaxis and development of allergy or intolerance.

Differential diagnoses

Intolerance/toxicity to a preservative in brimonidine or latanoprost/timoptol

Preservative toxicity is common and often can occur months, or even years, after commencing the topical agent. All glaucoma preparations that come in bottles lasting up to one month contain preservatives to prevent the overgrowth of bacteria – benzalkonium chloride is the most common preservative. Benzalkonium chloride can be toxic to the ocular surface – this results in a chronic, red, gritty eye that tends not to present as acutely inflamed as in this presentation.[4,5]

Viral conjunctivitis

Brimonidine allergy can clinically appear similar to viral conjunctivitis (both can cause follicular conjunctivitis); however, viral (typically adenovirus) conjunctivitis is associated with submandibular/preauricular lymphadenopathy, systemic URTI symptoms and often contacts with symptoms of viral conjunctivitis (which is very contagious). Herpes simplex virus (HSV) can also produce similar physical symptoms of unilateral red eye with discharge and can be associated with characteristic corneal staining (a dendritic ulcer). Varicella-zoster virus (VZV) can be associated with a V1 dermatomal shingles rash (ie herpes zoster ophthalmicus) and corneal changes.

Marginal keratitis

Marginal keratitis is a common cause of a red, painful eye associated with Meibomian gland dysfunction. This is commonly associated with dry eye syndrome. Slit lamp examination is the key to this diagnosis, revealing corneal limbal opacities where the lid margin is adjacent to the cornea.

Bacterial conjunctivitis

Bacterial conjunctivitis presents more acutely than viral conjunctivitis with a more prominent mucopurulent discharge. It typically responds well to topical antibiotic drops (eg chloramphenicol).

Acute anterior uveitis

Acute anterior uveitis can often be recurrent in predisposed individuals and may be associated with human leukocyte antigen B27 – rarely, it is associated with some systemic arthropathies (eg ankylosing spondylitis) or inflammatory diseases (eg sarcoid, Behçet's disease). Slit lamp examination reveals cells and flare in the anterior chamber and occasionally pupil distortion due to adhesions between the iris and lens.

Answer 3

If there is concern regarding viral conjunctivitis, polymerase chain reaction (PCR) for adenovirus, HSV1, HSV2 and VZV can be performed.

Answer 4

It is important to contact Mitsuishi's ophthalmologist or for Mitsuishi to see her ophthalmologist soon. Often the offending agent (presumably brimonidine) can be withdrawn; however, this may result in destabilising her IOP control. Her ophthalmologist should see her in the next 1–2 weeks to review the IOP and implement alternative IOP lowering if required.

Answer 5

Patients with glaucoma require ongoing monitoring and management of their IOP. Glaucoma occurs because IOP is associated with progressive damage to the optic nerve, which can result in irreversible vision loss. The IOP is often elevated (>21 mmHg) at presentation, but not always – 30–50% of glaucoma is normal tension glaucoma, in which glaucoma occurs even when the presenting IOP is normal. Treatment still involves lowering the IOP.

Reducing the IOP is the best treatment available to prevent or slow the progression of glaucoma. It can be achieved with topical drop agents, outpatient laser treatment (selective laser trabeculoplasty [SLT]) or glaucoma surgery. Generally, topical agents and/or SLT are used in initial management, with surgery reserved for when other options are exhausted.

Glaucoma patients often have a target IOP set by their ophthalmologist. This is based on their rate of glaucoma progression, which is measured by performing serial tests to determine the degree of glaucoma at each time point. These glaucoma tests are:

- optic nerve scan – this detects thinning of the retinal nerve fibre layer around the optic nerve head from glaucoma
- macular ganglion cell complex scan – this detects thinning of the inner macular layer from glaucoma
- visual field test – this is performed to assess changes in peripheral vision from glaucomatous damage.

These tests are important to monitor glaucoma progression; patients generally do not detect vision loss from glaucoma symptomatically until it is relatively advanced – ideally glaucoma should be detected and managed before this time.

It is plausible that three months ago Mitsuishi's IOP was not at target, her glaucoma tests were getting worse or she was developing haemorrhages around the optic nerve, which is indicative of unstable glaucoma.

Answer 6

Mitsuishi's eye symptoms will resolve on removal of the brimonidine. She may require IOP lowering by alternative means (eg a topical carbonic anhydrase inhibitor [such as brinzolamide, dorzolamide] or SLT).

It is noteworthy that topical medication typically begins with a once daily prostaglandin analogue – in this case, latanoprost. Should this be insufficient to control the IOP, it is common to add a β-blocker (provided there are no systemic contraindications to a topical β-blocker). Combined timoptol/latanoprost can be administered from the same bottle.

Should topical medication and SLT be insufficient to control Mitsuishi's IOP adequately, and should her glaucoma continue to progress, in the future she may require a glaucoma filtration procedure (eg trabeculectomy) to control the IOP.

Often patients with glaucoma are unaware of any major visual problems associated with glaucoma but can be bothered by side effects of topical therapy. Eyedrops can cause a wide range of systemic and local symptoms that affect patients' quality of life.[6]

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CASE

4 Ethan's eyes are not focusing together

Ethan, aged two months, is a well child brought to your clinic by his mother, Kerryn. Kerryn thinks that Ethan's eyes do not appear to move together at times, which has been the case since birth. While the condition occurs intermittently, it is a major concern for Kerryn, who is a first-time mother. Kerryn is also concerned that Ethan is light sensitive at times, although she thinks this is getting better.

Ethan was delivered at term after an uneventful pregnancy. He has normal developmental milestones to date and is on the 75th centile for both height and weight. His head circumference has always been just under the 100th centile. Kerryn has noticed that the amount of time that Ethan's eyes appear crossed has improved since he was a newborn, but she still feels that Ethan's eye alignment is not correct.

Question 1

What would be your initial approach to this consultation?

Further information

On examination, Ethan appears visually alert and can fix and follow a light-up toy both horizontally and vertically, with a good range of movement. His corneal reflections appear central, but he does have broad epicanthal folds, with the right side being slightly larger than the left. When he follows an object to the left, he appears to have a convergent right eye.

Question 2

What is your differential diagnosis?

Further information

Kerryn returns with Ethan three months later, as she feels that Ethan's eye turn has again increased. Now the left eye appears to be turning in as well, especially when he is tired. With Ethan sitting in front of you, his left eye appears to be converging towards his nose.

Question 3

Has Ethan's diagnosis now changed?

Further information

Kerryn wore glasses from the age of three to 10 years as she had an esotropia (ie convergent squint) and was hypermetropic (ie long sighted). She can remember having to patch one eye but did not have surgery to her eyes to improve her eye alignment.

Question 4

Is the family history relevant?

Question 5

Is there any urgency in the timing of a referral to an ophthalmologist?

CASE 4 Answers

Answer 1

At birth, an infant is very sensitive to bright light and has small pupils, limiting how much light enters the eyes. A newborn baby has peripheral vision, but their central vision is not yet developed because of an immature retina. Over the next couple of weeks, as the retina develops, the pupils increase in size and babies begin to see light and dark as well as patterns. It is common for babies up until approximately three months of age to have misalignment of their eyes that is intermittent. This misalignment can be convergent, divergent or a vertical deviation.

The differentiation between a true strabismus and a pseudostrabismus requires assessment of ocular alignment. When using a torch to view the corneal light reflections, they should be symmetrical to the examiner – the bright small spot from the torch light reflection should be in the centre of cornea. An easy way to assess what the parents/carers are viewing is by performing a Family Album Test (FAT). Most parents/carers will have a mobile phone with multiple photographs of their new infant. Ask them to find the 'worst' photograph of the eye turn they have seen. Look at the photograph and assess the symmetry of the corneal reflections on these photos. It is also important to check the red reflex is symmetrical between the eyes in the photos. This can also be checked in the clinic by looking through the direct ophthalmoscope with the circle of light projected over both eyes at the same time from a few metres away (ie Brückner reflex). An abnormal reflex in one eye should trigger a semi-urgent ophthalmology referral.

Answer 2

The most likely diagnosis is pseudostrabismus (Figure 1).

Figure 1. An example of pseudostrabismus

The majority of young babies have a flattened nasal bridge and broad epicanthic folds. If the folds are asymmetrical, then the eye with the larger fold will appear to be convergent or esotropic and thus the appearance of a pseudostrabismus occurs. This 'optical illusion' usually starts to improve by the age of six months as the face enlarges and the nasal bridge begins to form.

Answer 3

Ethan's diagnosis is no longer a pseudostrabismus and he needs to be reviewed by an ophthalmologist. It is not uncommon for infants with strabismus to present with a stuttering onset and, over time, the deviation becomes constant (Figure 2).

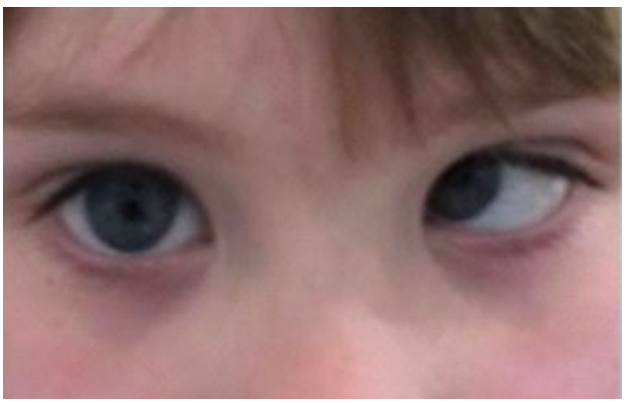

Figure 2. Left esotropia (ie convergent squint)

The incidence of children diagnosed with a pseudostrabismus who later develop a true deviation is 10%.[1]

Answer 4

Ethan, like his mother, may be hypermetropic, and this could cause the intermittent convergent squint. He needs a dilated examination by a qualified ophthalmic practitioner to delineate his degree of long-sightedness and exclude other retinal pathology. It is likely that Ethan will be prescribed glasses for full-time wear. The aim of the glasses is to control the convergent deviation with the glasses in situ and help Ethan to develop equal vision between his eyes and binocular functions including stereoacuity. The genetics of strabismus are uncertain, but the risk of strabismus developing in a child with a positive family history is 17.6%.[2]

Answer 5

At approximately six weeks to two months of age, a baby will start to fix and focus on objects close to them and smile at faces. By three months, they should be able to track objects of interest to them.[3]

Hence, the alignment of the eyes in a child aged <3 months can be variable. They can have episodes of convergence, divergence or vertical misalignment of varying degrees and duration.[4] By the age of 4–5 months, eye alignment should be stable and there should be no intermittent or constant deviation.[4] If Ethan's eyes are not well aligned when wearing his glasses, there is a role for strabismus surgery to improve his alignment further. The current literature suggests that this should be completed prior to the age of 10–12 months as this

is the window of neurological development of binocular dominance columns that enable binocular functions and stereoacuity. These higher cortical centres can only develop if the eyes are aligned.[5]

Conclusion

Ethan is referred to an ophthalmologist, who diagnoses him with an infant-onset esotropia (ie he has developed a true strabismus prior to the age of six months). The ophthalmologist recommends glasses as Ethan is hypermetropic, but also discusses with Kerryn the role of early surgery for Ethan if he does not have good alignment when wearing glasses.

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CASE

5 Jason wants to be kept in the dark

Jason, aged 40 years, is a man who presents with red eyes that developed one week ago. You see him wearing sunglasses in the waiting room. When he walks in, he asks if you can turn down the lights in the consulting room. He also describes a deep ache around his eyes. You ask Jason about any discharge or watery eyes. He replies that there is minimal discharge. His eyes were not stuck together in the morning. His eyes are not itchy, and he does not have hay fever.

Question 1

How would you differentiate typical conjunctivitis from uveitis-related red eyes in taking a history from Jason?

Further information

On further questioning, Jason says he has had two similar presentations in the past.

He has stiff back pain that is worse in the morning or after lying still for prolonged periods of time. He also has mild psoriasis and irritable bowel syndrome.

You ask him specifically if he had recent eye surgery or injections to his eyes to exclude intraocular infections. Jason tells you he has not had any eye surgery or eye injections and is otherwise feeling well. He does not have a fever nor signs of sepsis suggesting endogenous spread of infection from other parts of the body.

Question 2

How would you differentiate typical conjunctivitis from an atypical presentation on examination?

Further information

Pulling the lower lids down, you examine the conjunctiva. The redness is mostly over the sclera. Jason's vision is impaired in his left eye: right visual acuity is 6/12; left visual acuity is 6/36. His left pupil is small and fails to dilate normally in dim lighting. Recalling the history of inflammatory back pain, you suspect it could be linked to his anterior uveitis, as a part of a human leukocyte antigen B27 (HLA-B27) syndrome.[1] Jason requires an eye assessment to confirm the diagnosis of uveitis.

Question 3

When the presentation does not fit with conjunctivitis, is there any harm in prescribing chloramphenicol drops?

Question 4

Under what circumstances would you refer Jason to an optometrist or ophthalmologist on the same day?

Further information

You refer Jason to an optometrist, who confirms by slit-lamp examination the presence of cells in the anterior chamber of the eyes. Dilated examination shows the vitreous and retina are not involved. A diagnosis of anterior uveitis, also known as iritis, is made. Jason is referred to an ophthalmologist for further management.

You receive a letter of correspondence from the ophthalmologist outlining the following treatment. Jason commenced topical steroids (eg prednisolone acetate 1%) every hour for one week, every two hours for one week, four times per day for one week, followed by three times per day for one week, two times per day for one week and once per day for a week. In addition, he uses an eye drop (cyclopentolate) to dilate the pupil once a day for one month. The purpose of this drop is to stop adhesions forming between the iris and the lens. Jason's blood test for HLA-B27 is positive. Angiotensin converting enzyme and syphilis tests are normal. After two weeks, his eyes are back to normal. Jason asks you if he can now stop using all the drops.

Question 5

How would you respond?

Further information

Four months later, Jason returns with another episode of uveitis. He says this is just how it felt with his previous episode and asks you to prescribe more topical steroids.

Question 6

What would you do?

Question 7

Are there any circumstances in which you can prescribe topical steroid drops?

CASE 5 Answers

Answer 1

A prominent feature of conjunctivitis is discharge from the eyes. The eyes are often stuck together in the morning. The patient may have had a recent viral upper respiratory illness. Sometimes, there is a history of spread from other family members.

Uveitis-related red eyes present with photophobia and a deep ache around the eyes.[2] Patients describe it as a constant throbbing pain, not as a gritty, foreign body sensation. They may have had past episodes. When uveitis extends to the vitreous, many patients will describe floaters. Vision loss is much more likely in uveitis and other serious aetiology of red eyes when compared with conjunctivitis.

Answer 2

People with viral conjunctivitis commonly present with normal vision or mildly reduced vision. Redness from conjunctivitis is diffuse across the conjunctiva over lids and sclera. Conversely, uveitis-related red eyes affect the conjunctiva over the sclera only, while the lining over the lids remains a normal pale pink colour. In conjunctivitis, the pupils dilate and constrict normally. In uveitis, the pupil might be irregular in shape. It is especially prominent when the pupils are examined in dim light. The pupil of the eye affected by uveitis may not dilate. This is due to the adhesion between the iris and the lens.

Answer 3

When you suspect a patient's presentation is not simple conjunctivitis, prescribing a topical antibiotic will delay the diagnosis and consequently treatment. If the correct treatment is not commenced, inflammation from uveitis can progress over the next few days and will likely require more intensive and longer topical steroid therapy to control. Uveitis encompasses many causes; for some of these causes, delayed diagnosis could have sight-threatening or life-threatening sequelae.[3]

To confirm the diagnosis of uveitis, an examination is required. Optometrists and ophthalmologists have sufficient equipment to make the diagnosis.

Answer 4

If the patient recently had an eye surgery or received injections into the eye, same-day referral is needed to an ophthalmologist.

Similarly, if the patient is presenting with suspected uveitis, feeling unwell and with a fever, same-day referral is needed to a tertiary centre with an ophthalmology unit for suspicion of sepsis spreading to the eye (endogenous endophthalmitis).

Otherwise, urgent referral to optometrists/ophthalmologists within 1–2 days is safe in most circumstances.

Answer 5

After the uveitis settles, Jason is able to stop cyclopentolate, which dilates the pupil and blurs reading vision. The topical steroid needs to be continued beyond the duration of symptoms and tapered gradually. A premature sudden stop of the topical steroids can cause a reoccurrence of uveitis. Questions regarding the dosage for his eye drops are best directed to the ophthalmologist.

Answer 6

Jason may have a reoccurrence of uveitis. However, it is recommended to refer the patient to an optometrist or ophthalmologist to confirm uveitis by examination.
The severity of the inflammation will correlate with how often to put in the topical drops. Long-term topical steroids use is associated with glaucoma and cataracts.

Referral to an optometrist or ophthalmologist ensures the patient's eye pressure can be monitored. When there are multiple documented episodes of uveitis, the treatment can be escalated using second-line medications such as methotrexate and mycophenolate.

Answer 7

Giving a repeat prescription of topical steroid is safe when there is a continuing treatment plan and follow-up appointment in place from an ophthalmologist. In patients with a history of uveitis, a thorough examination of the eyes by an eye care professional is recommended prior to commencing topical steroids by general practitioners.

As with any medical condition, the diagnosis needs to be reached prior to the start of treatment.

Resources for doctors

- American Academy of Ophthalmology – Eyewiki, https://eyewiki.org/Main_Page

Resources for patients

- Better health channel – Eyes: Uveitis, www.betterhealth.vic.gov.au/health/conditionsandtreatments/eyes-uveitis#:~:text=Uveitis%20is%20inflammation%20of%20the%20middle%20layer%20of%20tissue%20in,more%20correctly%20called%20anterior%20uveitis

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CASE

6 Patricia has a red eye

Patricia, aged 73 years, is undertaking topical treatment for glaucoma. Patricia attends your clinic with her husband, David, aged 80 years. Patricia works part time as a lecturer and lives at home with David. She comes to see you as her right eye has been red for the past two days, and this morning she woke with right eye pain. Patricia is afebrile and has no other complaints today. Her general health is good aside from hypertension; she does not smoke and only drinks a glass of wine on occasion.

Question 1

What questions would you ask Patricia about her current condition?

Further information

Patricia was marking student essays this morning and noted that her right vision was blurry; this was unusual as she normally has good vision. You determine that Patricia is certain that there was vision loss and that it had occurred acutely. During the drive to see you, she became increasingly light sensitive and sat in the waiting room wearing sunglasses. Patricia was fortunate that David was able to bring her to the surgery as she would have had difficulty driving.

The pain in her right eye was very mild yesterday, and today Patricia reports a scratchy pain that is worse when she blinks.

No one else Patricia knows has had a red eye, and there has been no discharge from the eye.

Question 2

What would you ask Patricia about her past ocular history to assist you in the diagnosis?

Further information

Patricia does not recall any trauma to the eye or foreign bodies entering the eye over the past week. She wears glasses to correct her vision and has never worn contact lenses.

Patricia has been using eye drops for her glaucoma for the past 20 years. She now uses three topical therapies in her right eye: latanoprost at night, brimonidine tartrate twice daily and brinzolamide twice daily. She uses latanoprost at night in the left eye. You notice that all these medications contain preservatives. Patricia is worried about losing vision from glaucoma so she uses her eye drops regularly and replaces the bottles every 28 days. Patricia is careful when she instills her eye drops, washing her hands beforehand and making sure the bottle does not touch the eye or eyelid. At times she also has dry eye and uses tear substitutes when her eyes are red and irritable.

Patricia has never had a cold sore on her lips nor had herpes zoster ophthalmicus (shingles).

Question 3

What examination would you next perform?

Further information

Patricia reads the eyechart with her glasses on as she needs them for clear distance vision. Her current glasses are only two months old, so you can be confident that they should adequately correct her vision. On the chart, Patricia reads 6/60 on the right and 6/6 on the left; her right vision is significantly reduced. Visual fields to confrontation are full.

Question 4

How would you assess the eye?

Further information

You assess Patricia's right eye with a torch. Her direct and consensual pupil reactions are normal. Both the eyelids are erythematous and the lashes thickened; this is not surprising as Patricia has been using latanoprost. The right conjunctiva is injected. There is a white spot on the cornea, near the pupil, and inside the eye, in the anterior chamber, there is a white fluid level (hypopyon). With the direct ophthalmoscope the red reflex is present, indicating that the vitreous is likely clear of infection. After instilling fluorescein, you note an epithelial defect is present that is approximately the same size as the infiltrate.

Question 5

How would you manage Patricia?

CASE 6 Answers

Answer 1

It is critical to ask Patricia if the vision in her right eye is affected. For patients with a red eye with reduced vision, keratitis is a more likely diagnosis than conjunctivitis.[1] Similarly, photophobia is more likely in keratitis.[1] It is recommended to specifically ask the patient whether there is a change in vision and/or photophobia. Eye pain is another common symptom of keratitis; the severity of the pain should be established. Pain out of proportion to the severity of the infection can occur when microbial keratitis is due to the protozoan Acanthamoeba.[2,3] Although Acanthamoeba keratitis is uncommon and typically occurs with trauma or contact lens wear, it is important to consider as it can be difficult to treat if the diagnosis is delayed, leading to months or sometimes years of therapy.[2,3]

Ocular discharge does not routinely occur in microbial keratitis, unlike in conjunctivitis, and is not usually caught from another person. A history of red eye contacts is more typical of conjunctivitis.[1,4]

Answer 2

Taking a comprehensive ocular history can identify possible risk factors for microbial keratitis. Microbial keratitis typically occurs when the corneal epithelial barrier is compromised; this may occur with contact lens wear, trauma and other ocular conditions – particularly those that require topical therapies.[5–8] Contact lenses are particularly a risk when handled with poor hygiene or if a person swims while wearing contact lenses or wears them in spas or saunas. Trauma is responsible for a silent epidemic of blindness in the developing world as it may lead to microbial keratitis.[9] When trauma occurs with vegetative matter, fungal keratitis can follow; this can be difficult to treat, with surgery often required.[10,11] For glaucoma, the greater the number of therapies a patient is administered topically, and the longer the duration, the higher their risk of developing ocular surface disease, particularly if the medications contain preservatives.[12–14] Patients with labial cold sores are at increased risk of herpes simplex keratitis, which can occur with or be a risk factor for microbial keratitis. Similarly, herpes zoster ophthalmicus can be associated with keratitis. Eye drops used past their expiry date and with poor hygiene may also predispose to infection.

Answer 3

It is important to measure and record the vision. If a patient normally wears distance glasses, then vision should be assessed with the patient wearing them. When glasses are worn but the patient does not have them at the appointment, or the glasses are old, a pinhole can be used to check the vision; this will compensate for the glasses need.

The vision chart should be six metres away from the patient and read with the room lights on if it is not illuminated. The vision from the right eye is recorded first with the left eye covered and vice versa.

Visual fields to confrontation are performed by sitting in front of the patient with both you and the patient covering the opposite eye. To perform this test, hold up a variable number of fingers in each quadrant of the vision and ask the patient how many fingers you have held up in each quadrant, while the patient looks directly at you with the uncovered eye. Testing visual fields to confrontation can quickly uncover any visual field defects. Loss of peripheral vision is not typical in keratitis but may be present if the keratitis has spread to involve the interior structures of the eye (endophthalmitis). In Patricia's case, the visual field may be reduced because of her glaucoma.

Answer 4

Pupil reactions should be tested using a torch but are generally normal in patients with keratitis unless there is severe endophthalmitis or other ocular disease that has affected the optic nerve. The torch is shone first at each eye in turn and a pupillary constriction sought; this is the direct pupil response. Next the eye is examined for a consensual response; the torch is shone in one eye and the other eye is viewed – it should constrict.

The torch can then be used to examine the eyelids and eyeball. In microbial keratitis, there may be signs of anterior blepharitis (crusting of the eyelids), which can be a risk factor for infection. Eyelids that do not close properly can predispose the cornea to erosions and thus infection. When using glaucoma drops that contain a prostaglandin analogue such as latanoprost, the eyelids may be erythematous, and lashes thickened. The presence of these eyelid changes may alert the clinician to a history of usage of this type of eye drop.

Dilated and engorged conjunctival vessels most marked around the cornea are typically present in keratitis as well as a visible white spot – an infiltrate, seen on the cornea. The infiltrate size increases with the severity of the infection. In the early stages of Acanthamoeba keratitis, the cornea may appear relatively normal or lack a clear reflex. This infection must be suspected if a patient has been swimming while wearing contact lenses, particularly if the patient has pain out of proportion to the physical signs. A hypopyon is an accumulation of inflammatory cells in the anterior chamber and appears as a white area in the front of the eye. Microbial keratitis may be associated with a hypopyon.

A direct ophthalmoscope can be used to check the 'red reflex'. In microbial keratitis, the red reflex may be intact unless there is significant involvement of the anterior chamber with inflammation or in endophthalmitis.

If fluorescein drops or strips are available, they can be used to confirm a corneal ulcer that will typically be similar in size to the infiltrate. Fluorescein is instilled in the conjunctival sac and viewed with a cobalt blue light, which may be available on the direct ophthalmoscope.

Answer 5

Microbial keratitis is an ophthalmic emergency. Patricia should be referred to an ophthalmologist or emergency centre with ophthalmic cover. Delays and/or inappropriate management can lead to loss of vision or the eye.[15,16] Ophthalmic care for microbial keratitis involves taking a sample from the cornea by a corneal scrape procedure; the sample is sent to the laboratory for culture to identify the causal organism(s). A large diversity of organisms can cause microbial keratitis.[17] Knowledge of the infecting organism provides epidemiological data and guides management by the ophthalmologist. Empiric therapy is begun while waiting for the microbiology results.

Current Australian guidelines recommend empiric fluoroquinolone monotherapy (0.3% ciprofloxacin or 0.3% ofloxacin) or fortified combination therapy with 5% cephazolin plus 0.9% gentamicin.[18] Current antimicrobial resistance surveillance data indicate that in vitro chloramphenicol plus gentamicin or fluoroquinolone were superior to monotherapy with a fluoroquinolone or fortified cefalotin/cephazolin plus gentamicin.[19] Surveillance data for antimicrobial resistance are needed Australia-wide to inform therapy for keratitis. Topical therapy is usually given hourly day and night for at least two nights, with the patient admitted to hospital if they are unable to comply with this regimen.

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CASE

7 Fadil has intermittent difficulty with vision

Fadil, aged 38 years, is a software engineer who has recently been diagnosed with type 2 diabetes. Prior to this recent diagnosis, he had not seen a medical practitioner or another health professional for many years. He reports intermittent difficulty with his vision.

Question 1

How would you assess Fadil? What are important points to elicit in the history, and what signs would you look for on examination?

Further information

You take a history from Fadil. He is unaware of any medical conditions other than his recent diagnosis of type 2 diabetes. He does not wear glasses and has not seen an optometrist for many years. On examination, you find his best corrected visual acuity (BCVA) in his right and left eye to be 6/7.5 and 6/6, respectively. You examine his fundus for signs of diabetic retinopathy. On fundoscopy, the clinical signs seen in the right eye (Figure 1) are:

1. Microaneurysms and dot/blot haemorrhages are present in all quadrants of the retina. Microaneurysms are localised outpouchings of the capillary wall. Dot/blot haemorrhages are intraretinal haemorrhages located in the middle layers of the retina.[1]
2. Retinal new vessels, which are known as neovascularisation elsewhere. These abnormal vessels form in response to retinal hypoxia. They are friable and bleed easily as they contain few or no pericytes.[2]
3. Sclerosed vessel.
4. Mild vitreous haemorrhage.

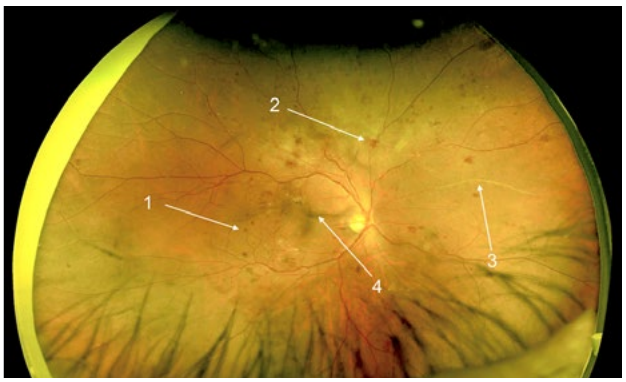

Figure 1. Right eye colour fundus photograph

The clinical signs seen in the left eye (Figure 2) are:

1. Microaneurysms and dot/blot haemorrhages.
2. Hard exudates are waxy yellow lesions that comprise lipoprotein and lipid-filled macrophages. They often surround leaking microaneurysms.[1]
3. Cotton wool spots are localised areas of neuronal debris that accumulate in the retinal nerve fibre layer.[1]

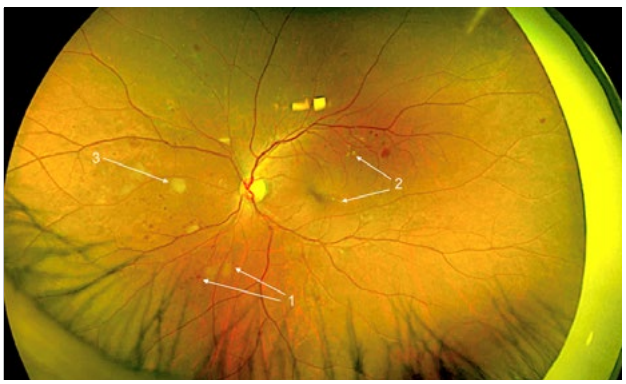

Figure 2. Left eye colour fundus photograph

Question 2

How is diabetic retinopathy graded?

Further information

The findings on ophthalmoscopy indicate proliferative diabetic retinopathy (PDR) in the right eye and severe non-proliferative diabetic retinopathy (NPDR) in the left eye. You therefore refer Fadil for urgent ophthalmology assessment.

Question 3

What are the sight-threatening complications of diabetic retinopathy?

Question 4

What further ocular investigations may be required?

Further information

Optical coherence tomography (OCT) scans are undertaken for Fadil (Figure 3), which indicate a normal foveal contour in each eye and no signs of diabetic macular oedema. The ophthalmologist also performs fundus fluorescein angiography (FFA; Figures 4 and 5).

In the right eye (Figure 4), bright spots indicated fluorescein leakage secondary to neovascularisation. These new vessels were away from the optic disc. A large area of capillary non-perfusion was also evident.

In the left eye (Figure 5), there were numerous microaneurysms and areas of focal leakage, particularly on the nasal aspect (ie left side of image). There was no diffuse leakage suggestive of neovascularisation.

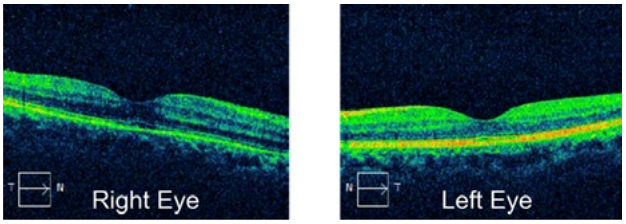

Figure 3. Macular optical coherence tomography scans of the right and left eyes

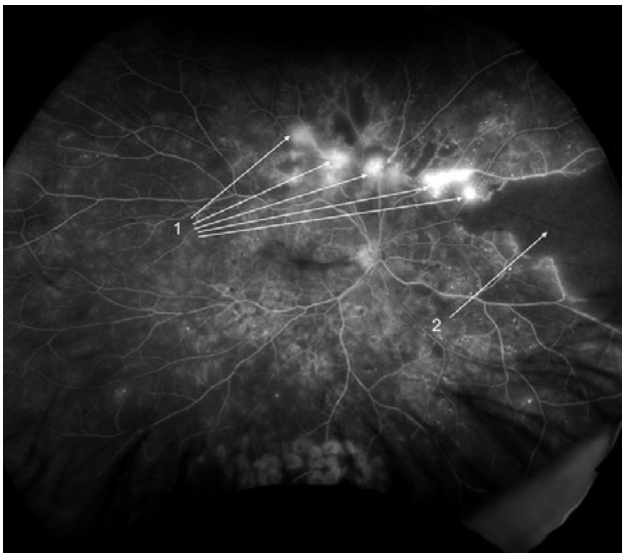

Figure 4. Right eye fundus fluorescein angiogram, showing fluorescein leakage secondary to neovascularisation (1) and a large area of capillary non-perfusion (2).

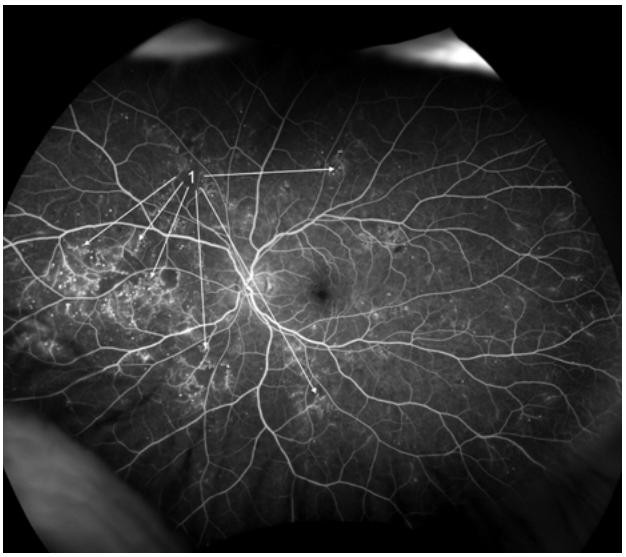

Figure 5. Left eye fundus fluorescein angiogram, showing numerous microaneurysms and areas of focal leakage (1).

Question 5

What are the likely diagnoses for the right and left eyes?

Question 6

What treatment might be administered by the ophthalmologist?

Further information

You receive a letter from the ophthalmologist. Panretinal photocoagulation (PRP) was performed to Fadil's right eye. The ophthalmologist will follow up periodically with Fadil.

Question 7

As a general practitioner (GP), how can you help Fadil manage his diabetic retinopathy?

CASE 7 Answers

Answer 1

The Royal Australian College of General Practitioners' (RACGP's) guidelines for management of type 2 diabetes recommend that patients should be screened and evaluated for retinopathy by an optometrist or ophthalmologist at the time of diagnosis (Grade A, level 1).[3]

GPs have an important role in ensuring that timely referral for screening occurs, and that patients with potentially vision-threatening complications are referred more urgently. The Royal Australian and New Zealand College of Ophthalmologists (RANZCO) has developed patient screening and referral pathway guidelines for diabetic retinopathy.[4] Clinical assessment should include the following.

Clinical history

- Duration of diabetes, medications, level of glycaemic control
- Vascular risk factors, including hypertension, hyperlipidaemia and smoking
- Diabetic complications (microvascular and macrovascular)
- Past ocular history

Risk factors for progression of diabetic retinopathy

- Diabetes duration >15 years
- Suboptimal glycaemic control
- Presence of vascular risk factors or diabetic complications
- Pregnancy
- Aboriginal and Torres Strait Islander or culturally and linguistically diverse background

Visual acuity

- BCVA (pinhole vision is acceptable)
- Recent or rapid deterioration in visual acuity should prompt referral even if vision is >6/9

Answer 2

Grading of diabetic retinopathy is as follows.[4]

1. Mild NPDR: Microaneurysms only
2. Moderate NPDR: Microaneurysms, retinal haemorrhages, venous beading
3. Severe NPDR: Microaneurysms and haemorrhage in all four quadrants of the fundus, venous beading in two quadrants, intraretinal microvascular abnormalities (shunts between retinal arterioles and venules that bypass the capillary bed)[1] in one quadrant (4:2:1 rule)

4. PDR: Any of neovascularisation at the disc, neovascularisation elsewhere, iris neovascularisation, vitreous or pre-retinal haemorrhage

Answer 3

Sight-threatening diabetic retinopathy includes:

- severe NPDR
- PDR
- foveal-threatening diabetic macular oedema.

NDPR affects 19.3% of people with diabetes, while 2.1% may have PDR and 3.3% may have macular oedema.[3] PDR occurs where retinal ischaemia leads to an increase in ocular production of vascular growth factors, resulting in retinal neovascularisation. These retinal new vessels have a predilection to grow into the vitreous, where they may bleed (resulting in vitreous haemorrhage) or fibrose and cause tractional retinal detachment.

Answer 4

There have been significant advances in retinal imaging in recent years. In addition to fundus photography, the following investigations would likely be performed:

- OCT imaging is used to obtain cross-sectional imaging of the foveal contour. Important features of diabetic macular oedema include an increase in the central retinal thickness, as well as the presence of intraretinal cystic fluid from leaking microaneurysms.
- FFA is used to further examine vascular changes to confirm proliferative disease, as well as assess for macular and peripheral retinal ischaemia. FFA involves intravenous injection of fluorescein dye, and changes in fluorescence are observed typically over a 5–10-minute period with fundal images captured over time. Ultra-widefield fluorescein angiography has improved the ability to determine peripheral retinal ischaemia and areas of peripheral retinal neovascularisation.

Answer 5

Right eye

As there is retinal neovascularisation in the right eye, Fadil has PDR in the right eye.[5] To have these findings, Fadil has likely had type 2 diabetes for many years before it was diagnosed.

Left eye

Fadil has signs of diabetic retinopathy in the left eye (microaneurysms and dot/blot haemorrhages in all quadrants), but no neovascularisation, so he has severe NPDR in the left eye.

There is no centre-involving macular oedema on OCT in either eye.

Answer 6

For management of PDR, the ophthalmologist would likely perform PRP to the right eye. The Diabetic Retinopathy Study showed that photocoagulation reduced the two-year incidence of severe visual loss by >50%.[6]

Consideration may also be given to ranibizumab (an anti–vascular endothelial growth factor agent). The results of Protocol S (a study comparing ranibizumab with PRP) found that ranibizumab therapy was non-inferior to PRP in terms of visual acuity at two and five years. However, this therapy is associated with more clinic visits and greater costs.[7–9]

Ongoing monitoring for the development of diabetic macular oedema, further vitreous haemorrhage and tractional retinal detachment is important.

Answer 7

GPs can assist with the following strategies for slowing the progression of diabetic retinopathy:

- Patient education regarding the disease and management plan, including the importance of attending follow-up appointments and treatment.
- Optimising control of blood glucose (refer to the RACGP's guidelines for diabetes management).[3] Glycated haemoglobin has been found to closely correlate with prevalence of diabetic eye disease. Intensive insulin therapy may be associated with worsening retinopathy during the first year; however, the long-term benefits of this therapy greatly outweigh the risks of early worsening.[10]
- Optimising control of blood pressure and lipids (refer to RACGP/Stroke Foundation guidelines for management of blood pressure and lipids).[11]
- Prescribe fenofibrate for suitable patients. There is evidence that fenofibrate slows the progression of diabetic retinopathy in patients with type 2 diabetes and pre-existing retinopathy and reduces the need for laser photocoagulation and vitrectomy surgery.[12] This is independent of whether the patient is taking a statin.[1] Patients taking fenofibrate should have serum creatinine and liver transaminases monitored.
- Smoking cessation should be advised, although this has not been definitely shown to affect retinopathy.[1]

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ACTIVITY ID **248623**

Ophthalmology

This unit of *check* is approved for six Category 2 points in the RACGP CPD program. The expected time to complete this activity is three hours and consists of:

- reading and completing the questions for each case study
  - you can do this on hard copy or by logging on to the RACGP website (www.racgp.org.au), clicking on the My Account button and selecting the *gplearning* link from the drop-down
- answering the following multiple choice questions (MCQs) by logging on to the RACGP website (www.racgp.org.au), clicking on the My Account button and selecting the *gplearning* link from the drop-down
  - you must score ≥80% before you can mark the activity as 'Complete'
- completing the online evaluation form.

You can only qualify for CPD points by completing the MCQs online; we cannot process hard copy answers.

If you have any technical issues accessing this activity online, please contact the *gplearning* helpdesk on 1800 284 789.

If you are not an RACGP member and would like to access the *check* program, please contact the *gplearning* helpdesk on 1800 284 789 to purchase access to the program.

Case 1 – Arne

Arne, aged 65 years, has just been diagnosed with type 2 diabetes. As his general practitioner, you consider how this diagnosis might affect his vision.

Question 1

Which one of the following is the recommended time to refer Arne to an optometrist or ophthalmologist for screening and evaluation?

A. At the time of diagnosis

B. Only if vascular risk factors are present

C. Only if there has been a rapid deterioration in visual acuity

D. In 12 months

Further information

The ophthalmologist notes that Arne has widespread microaneurysms, dot/blot haemorrhages and venous beading in his left eye (all four quadrants). There are no new vessels.

Question 2

What is the grading of diabetic retinopathy for Arne's left eye?

A. Mild non-proliferative diabetic retinopathy

B. Moderate non-proliferative diabetic retinopathy

C. Severe non-proliferative diabetic retinopathy

D. Proliferative diabetic retinopathy

Case 2 – Wendy

Wendy, aged 21 years, is a university student who comes to see you with a red left eye. She is a monthly replacement schedule contact lens wearer. Her left eye became red this morning. Wendy has noticed that her vision is reduced, and the light has been bothering her. Wendy has recently been camping and forgot to take her contact lens solution. She wore her contact lenses all day and night. You consider whether Wendy might have microbial keratitis or conjunctivitis.

Question 3

What symptom of Wendy's is more likely to occur with microbial keratitis than conjunctivitis?

A. Discharge

B. Reduced vision

C. Conjunctival redness

D. Eyelid redness

Case 3 – Akiko

Akiko recently had a cold. She presents to you today with bilateral red eyes and watery discharge. You examine Akiko's eyes by pulling her lower eyelids down. Her conjunctiva is red.

Question 4

Which one of the following features would indicate that Akiko's condition is **not** conjunctivitis?

A. Moderate-to-severe loss of vision

B. Eye lashes stuck together in the morning

C. Itchy eyes

D. Preauricular lymph node

Question 5

Which one of the following is a correct indication for chloramphenicol eye drops?

A. Bacterial conjunctivitis with yellow discharge

B. Viral conjunctivitis with watery discharge

C. Allergic conjunctivitis with itchy eyes and hay fever

D. Iritis with aching eye and severe photophobia

Case 4 – Reg

Reg, aged 80 years, presents reporting a recent deterioration in vision. His optometrist has previously advised you that Reg has macular drusen and diagnosed age-related macular degeneration. Reg is a cigarette smoker and has hypertension.

Question 6

Which one of the following is a sign or symptom that may suggest development of advanced macular degeneration?

A. Eye pain

B. Red eye

C. Distorted vision

D. Watery eye

Case 5 – Manisha

Manisha, aged 61 years, has recently been diagnosed with glaucoma. You review the recommended treatment options for this condition.

Question 7

Which one of the following is the recommended first-line topical medication to treat glaucoma?

A. Prostaglandin analogue

B. Beta-blocker

C. Carbonic anhydrase inhibitor

D. Alpha-2 agonist

Case 6 – Tyler

Tyler is a well full-term infant, aged three months, who is noted to have a misalignment of his eyes by his mother, Jamie. The misalignment noted by Jamie is intermittent, and you do not observe this during your consultation.

Question 8

Which one of the following is the most likely diagnosis?

A. A normal examination

B. Convergent strabismus or esotropia

C. Divergent strabismus

D. Pseudostrabismus

Case 7 – Abbas

Abbas, aged 62 years, is a well-known patient of your practice. He has poorly controlled type 2 diabetes and wears glasses for myopia. Abbas presents today with reduced vision in the left eye, flashing light in the left periphery and a report of large 'cobwebs' floating in his visual axis. You consider the possibility that Abbas has a detached retina.

Question 9

Which one of the following symptoms is most concerning for retinal detachment?

A. Flashes of light at night

B. Headache with nausea and vomiting

C. Fine floating dots that have been present for a couple of months

D. Dark curtain or shadow coming across the visual axis

Question 10

Which one of the following options is most suitable for Abbas' management?

A. Immediately refer Abbas to an ophthalmologist

B. Complete an assessment of Abbas including visual acuity, visual field to confrontation and direct ophthalmoscopy, then consider urgent referral to an ophthalmologist for dilated fundus examination

C. Send Abbas home with safety netting advice

D. Provide reassurance to Abbas and advise him to follow up with his optometrist in 1–2 months

check

Independent learning program for GPs