

Case 2 - A Lack of Vision**PBL Scenario : Keele Medical School**

1 Miss Anita Baghran was a 22 year old medical student and had worn myopic
2 contact lenses for a long time. During the summer vacation she went to her
3 optometrist, Mr Williams, for an eye check because of three worrying episodes of
4 double vision over the past year, each of which had lasted for several weeks and
5 had interfered with her studies, especially her ability to interpret microscope slides.
6 These symptoms were accompanied by a dull ache behind one or other eye which
7 were made worse by eye movement. The optometrist performed a full examination
8 and found a visual acuity of 6/12 in the right eye and 6/6 in the left. These visual
9 acuities could not be improved with spectacles or a pin hole. One year earlier, the
10 same optometrist had recorded her vision as 6/6 in each eye. He also found that
11 there was a reduction of movement of the left eye, specifically reduced abduction.
12 Mr Williams told Anita to consult her GP, who in turn referred her to the ophthalmic
13 casualty department of her local hospital.

PAUSE for discussion

14 She was seen in the ophthalmic casualty department by the on-call doctor, Dr Khan,
15 who Anita thought looked calm and efficient, and who confirmed the optometrist's
16 findings. Dr Khan also noted that there was a relative afferent pupillary defect
17 (RAPD) although she felt that examination of the ocular fundus did not show any
18 abnormality. In particular the optic discs appeared normal. It was noted that there
19 was reduced colour perception in the right eye. There were no other causes of
20 reduced vision in the right eye; no uveitis, cataract, retinal detachment, or glaucoma.
21 Anita was informed by Dr Khan that this examination aimed at establishing a
22 differential diagnosis, ruling out serious and common causes of visual loss and
23 selecting further investigations. Anita was reassured by the full information she was
24 given and it confirmed the positive impression she had formed of Dr Khan.

PAUSE for discussion

25 Anita went on to have a visual field assessment which showed a non-specific
26 reduction of the visual field in the right eye. She also had an urgent MRI scan which
27 showed several enhancing lesions with the T1 weighted sequence and several other
28 lesions with a T2 weighted sequence. These findings suggested active and old
29 demyelinating episodes. She was referred to the neurology team and underwent a

Scenario
split
into
sections

PBL Case 2-Tutor Notes

Facilitator / Tutor Notes

This case describes the presentation and clinical course of a young woman presenting with multiple sclerosis (MS). The symptoms of reduced visual acuity and altered colour perception are fairly typical. The course of MS is highly variable. Presentation with a single episode of optic neuritis would not lead to the diagnosis. However, some individuals may only experience a small number of episodes of demyelination over time, and experience minimal or only a very slow neurological deterioration. At the other end of the spectrum, frequent episodes may occur with rapid neurological deterioration and the development of significant disability. Students should consider the neurobiology of normal visual perception and how individuals cope with visual impairment.

Overview
of
Problem
Scenario

Specific ILOs (Intended Learning Outcomes)	
Scientific Basis of Medicine Facilitators have a copy of the ILOs so they know what exactly the students should be learning from the problem scenario in question.	<ul style="list-style-type: none"> • Understand the gross anatomy of the eye • Understand the neural circuitry of the retina • Understand the mechanism of phototransduction • Know the neural pathways involved in the transmission of visual data and the effects of transection at various levels in these pathways • Broad understanding of cranial nerve testing • Know some of the major disorders of vision • Know some of the major tests to assess vision • Review of cells and function of the immune system including cytokines • Review understanding of immune mediated disorders, Type 1 – Type 4 hypersensitivity and the mechanisms of autoimmune disease
Clinical, communication and IT skills	<ul style="list-style-type: none"> • Obtain an accurate neurological history • Communicate with people with sensory impairments
Individual, Community and Population Health	<ul style="list-style-type: none"> • Distinguish factors that can influence information processing and decision making, with reference to visual perception • Consider the impact of visual impairment on the individual • Assess the consequences for the individual and their social network

students do not get a copy of the tutor notes

Detailed Facilitator/Tutor Notes

Paragraph 1:

Comments/prompts for tutors (1): The major focus of discussion in this section should be on gaining an overall understanding of the gross anatomy of the eye and retinal structure and the muscles controlling eye movements (along with their nerve supply). Students should also briefly discuss the optical basis for refractive errors but limit a detailed discussion as they have covered this in Year 1.

The idea is that students work out most of this info for themselves by discussing the problem & using background knowledge

"22 year old medical student..., worn myopic contact lenses..." Other possible causes of reduced vision in a young contact lens wearer include corneal ulcer, retinal detachment, vascular event (retinal artery or vein occlusion) and optic neuritis from demyelination, but this discussion should be limited (students will have a broad based lecture called Common and Important Diseases of the Eye this week). Refractive errors are the most common cause, of course, and will be discussed in practical. This section also cues students to consider how disability and, more specifically, visual impairment could impact on one's ability to study medicine and the adjustments and any adaptations to the physical environment which would need to be made. This links with the EL session on Communicating with People with Sensory Disabilities (Week 1).

Facilitators may 'drop-feed' this info as the students work through the scenario, as and when the need is identified

"episodes of double vision"

Double vision (binocular diplopia) is caused when there is weakness or paralysis of one or more extra-ocular muscles so that the eyes are no longer correctly aligned.

Internuclear ophthalmoplegia is characteristic symptom experienced by MS patients and occurs when demyelination affects the neurons of the medial longitudinal fasciculus, a centre in the brain stem that coordinates movements between the two eyes. This results in the rectus muscles not contracting effectively so the eyes do not move in tune with each other producing double vision. This can also occur in stroke and myasthenia gravis.

"interfered with her studies... ability to interpret microscope slides"

Interference with her studies is a trigger to consultation but note that she had delayed until summer. Students should be able to apply what they already know about triggers and barriers to consultation. This section also cues a distinction

Intended Learning Outcomes - decided by students

ILOs

1. Anatomy
 - a. Cranial nerves – II, III, IV, VI
 - b. Eye + optic nerve
2. Histology of the eye
3. Neurobiology of vision
 - a. Visual pathway
 - i. Phototransduction of rods and cones
 - ii. Pathway of visual stimulus, optic tract
4. What is the function of myelin in relation to ..
5. How is MRI effective in diagnosing MS?
6. Overview of (how vision is affected):
 - a. Myopia
 - b. Glaucoma
 - c. Cataract
 - d. Uveitis
 - e. Retinal detachment
 - f. MS
 - g. Etc etc.
7. What are the mechanisms of treatments
 - a. Prednisolone
 - b. β -interferon
8. How are symptoms explained:
 - a. Double vision
 - b. Dull ache behind eyes (worsened by eye mov.)
 - c. Reduced abduction
9. Review ROCKs lecture
10. Social support for people with visual impairment