Imaging the equine posterior segment

With the smartphone
Imaging the posterior segment

Approach – “tell a story of the image’s journey”

Understand pros and cons of direct vs indirect ophthalmoscopy

Techniques To master:

- Continuous light- know how to use and how to alter intensity
- Getting close
- Use the LED location on the phone to help you

How to image the:

- Optic nerve head
- Tapetal fundus
- NTF
The visual axis
Visual axis

Document using distant direct.
Remember to document all 5 angles:

Nasal
Temporal
Superior
Inferior
Axial
Imaging the equine vitreous
Vitreous

Start at vitreal base, 4 angles
Video often helpful to document opacities
Vitreous

Start at vitreal base, 4 angles

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Vitreous

Start at vitreal base, 4 angles

Video often helpful to document opacities
Imaging the equine fundus
November 12, 1704; Jean Méry presents to the French Royal Academy of Sciences

Jean Méry had reported to the Academy the observation that, by submerging the head of a living cat in water, one provoked dilatation of the pupils, which could not be reduced by light. In this way, the elements of the fundus oculi are rendered visible. That occurs, according to Méry, by flattening the irregularities of the surface of the cornea by contact with water. Méry’s memoir is without question the first publication, not only of the visualization of the elements of the fundus oculi, but also of the neutralization of corneal dioptric power of a living eye in a liquid, which is an essential part of optical contact systems.
The solution?
Fundoscopy – seeing the retina

On March 20, 1709, Philippe de La Hire pointed out that this was due to the abolition of the corneal refraction. Méry’s experiment of eye immersion for fundus visualization was repeated and supplemented later in humans: in 1845 by Adolf Kussmaul, in 1851 by Johann Nepomuk Czermak for the construction of the orthoscope, and in 1891 by Oswald Gerloff, who took the earliest successful fundus photography.
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A new Ophthalmoscope for photographing the posterior internal surface of the living eye. By A. M. Rosebrugh, M.D., Toronto.

CONSTRUCTION:—THE TUBES.

This instrument consists of a small photographic camera, to which are adapted two brass tubes (A and B) which meet each other at right angles (Fig. 1), 1½ inch in diameter, being respectively 4 and 2½ inches in length. The longer tube B moves freely in the aperture of the camera, and the shorter tube A is turned towards the source of light.

A tube of the same width C, 1½ inch in length, is joined to the side
The position of the instrument when the light is supplied by a lamp:—1, the camera; 2, camera tube; 3, illuminating tube; 4, diaphragm with central aperture; 5, slide with ground glass; 6, glass chimney of lamp; 7, brass tube four inches in diameter, which acts as a shade, and from which projects 8, a brass collar opposite the flame of the lamp, and to which is adapted 3, the illuminating tube of the instrument; 9, upright of the lamp stand; 10, eye-piece containing a camera lens of three inch focus to be adapted to the free extremity of the camera tube: when the eye-piece is used the camera is dispensed with.
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Direct vs indirect ophthalmoscopy

Direct fundoscopy
Small FOV = greater detail
Doesn't like opacities in the visual axis
Need to be close to the cornea

Indirect fundoscopy
Modality of choice in small animals – less widely used in equine
Wide FOV = less detail
Copes well with opacities in the visual axis
A distant technique
Indirect
Guess the species
Guess the species
Field of view: determined by camera
Direct fundoscopy
Tell a story
Tell a story
Tell a story
Technique
Diffuser, app &/or physics to dim the light
The visual axis
The fundus
Manual focus & telephoto lens (iPhone Xsmax)
Optic nerve head
Nerve fibre layer
Non tapetal fundus
Tapetal fundus
Tapetal hyperflectivity
Practical session 4: posterior segment
Task 1: Use Distant direct to identify anterior vitreal or peripheral retinal abnormalities using eye model
Task 2: Use close direct phoneoscopy to directly image the fundus.
Thanks for listening