Tips and tricks to improve ocular photography in practice

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Advantages of performing ocular photography

Digital photography of the equine eye is a helpful tool in documenting and following ocular disorders. The multi-talented smartphone can be used, not only as a camera, but can be used as a stall-side client-education device and also plays an important role in case management. By routinely obtaining images from one examination to the next it is much easier to observe subtle changes and to objectively document positive or negative changes throughout the treatment period. Pictures of the eye (and fundus) as well as of unusual cytology findings can be sent to a specialist for consultation. Ocular photography can also be helpful in documenting findings during a pre-purchase exam.

What to do prior to taking the image

Images should be taken in a dark area, or at least out of direct sunlight. Mild sedation of the horse with detomidine hydrochloride (Domosedan, 0.1-0.2 ml/100kg bwt i.v.), as well as eyelid blocks (palpebral and the frontal nerve blocks) using 2% mepivacaine (Scandicain 2%) will not only facilitate an efficient and thorough ophthalmic examination, it will also make taking images much easier. Once the horse is sedated, the head should be placed on a head support (table, hay bales) to improve compliance (Figs. 1 & 2). To avoid artefacts, the person restraining the horse should stand on the opposite side of the horse from the eye that is being photographed. Artefacts due to reflection can also be minimized by wearing dark clothes and gloves (Fig. 3).

Figure 1. Head supported using a saddle horse and blanket.

Figure 2. Horse’s head placed on a mobile cart with pads following sedation.

Figure 3. Wearing black gloves to open the eyelids can help to minimize corneal reflection artifacts from light-colored gloves or bare skin.

Imaging the equine eye

The distance between camera and eye should be chosen somewhere between 15 to 35 cm. The flash should be activated and a separate handheld light source (Finoff transilluminator or a flashlight with a relatively uniform beam of light (Fig. 4) should be used to further illuminate any specific areas of interest on the eye.

Figure 4. This Pelican LED pocket flashlight emits a uniformly bright beam of light and has both a dim and bright setting.

Taking pictures from different angles can further help to improve the interpretation of the lesions of interest (Fig. 5).

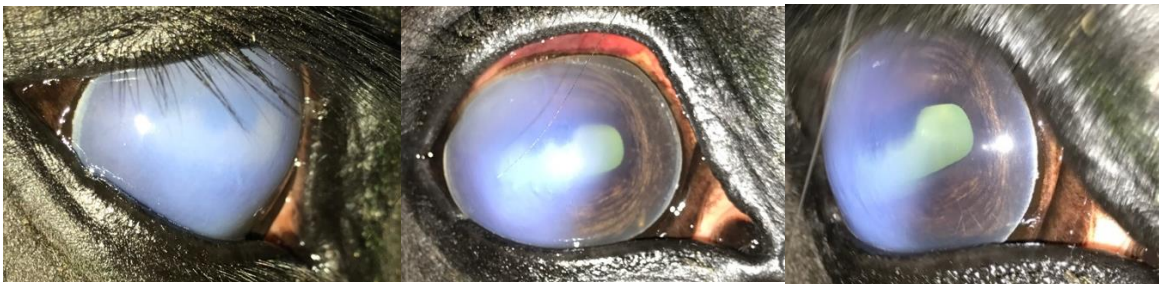

Figure 5. Three images taken from different angles. Left: From temporal. Middle: Straight on from the side. Right: From medial. Individual images (for example the left and right images, can lead to an inaccurate clinical assessment.

Infrared imaging

The longer wavelength of infrared light penetrates corneal edema or -fibrosis better than wavelength of traditional photography (Fig. 6). Better detail of corneal vascularization and cataractous changes of the lens are some more advantages of an infrared camera. This type of photography requires a camera sensor conversion that is currently unavailable for smartphones. However, digital single lens reflex (DSLR) cameras, mirrorless digital cameras and point and shoot digital compact cameras can all be converted. There are many factors and options to consider when selecting a camera for modification, and the following websites

provide a wealth of valuable information to help you make your decision: www.lifepixel.com and www.kolarivision.com.

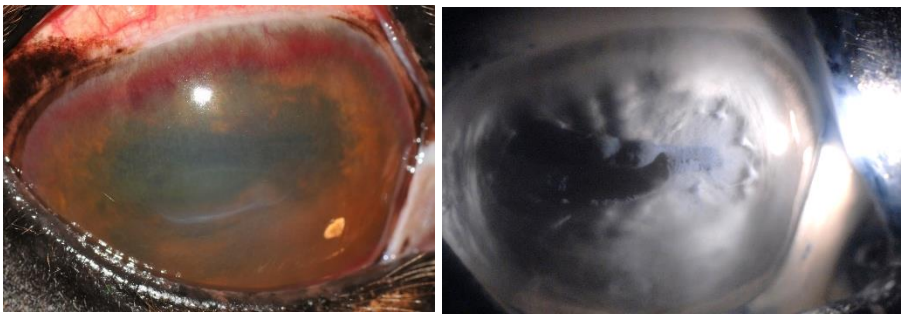

Figure 6. Left is a digital color image of a horse with an acute bout of uveitis. Note the limited visualization of the iris and pupil due to the diffuse corneal haze. Right is a digital infrared (IR) image of the same eye. Due to their longer wavelengths, IR light is less susceptible to scatter, thus allowing them to pass more or less unrefracted (bent) into the anterior chamber. Note the increased visualization of the anterior iris surface and the pupil.

Fundus photography

In order to obtain appropriate and accurate fundus images, the pupil must be fully dilated. It can take from between 20-40 minutes for the pupil to become fully mydriatic (dilated) following topical applications of tropicamide (Mydriacyl, 0.1ml) (duration of action 4-8 hours). The cell phone camera can be used to perform indirect ophthalmoscopy in conjunction with a +14D, +20D, or Pan Retinal (Fig. 7) condensing lens. The flashlight of the camera serves as the illumination source.

www.eickemeyer.co.uk

Figure 7. Pan Retinal condensing lens.

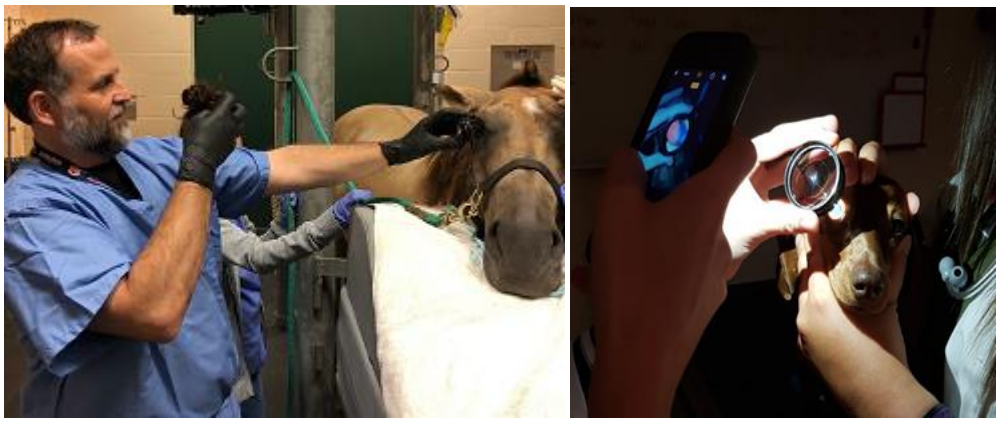

Figure 8. Indirect ophthalmoscopy in conjunction with a condensing lens.

www.digitaleyecenter.com

Figure 9. Smartphone (iPhone) with a fundic imaging lens adapter attached.

There are also sole use fundus cameras (e.g., Clearview, Optibrand, Fort Collins, CO) that can be adapted to the smart phone offer another possibility to obtain fundic images and videos (Fig. 10 & 11).

Figure 10. Clearview camera being used to image the fundus of a 7 year old Icelandic horse mare. The image is transfered via a USB cable to a laptop (not shown).

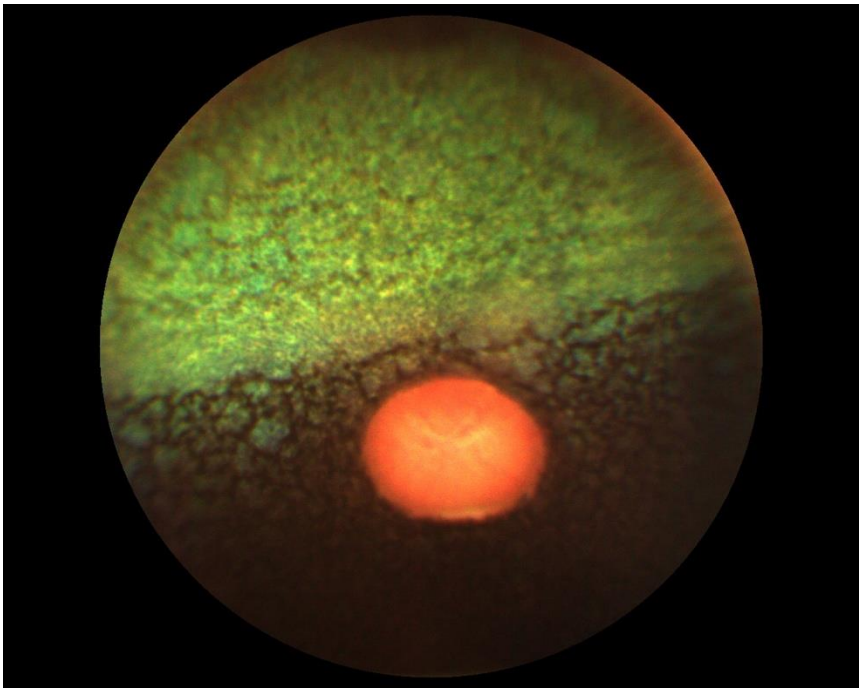

Figure 11. Fundus image of a 10 year old American Paint horse gelding with equine motor neuron disease (EMND). Note the reticulated pattern of pigment clumping that is a consistent ocular finding in affected horses. This image was taken with a Clearview fundus camera (see fig. 9).

Additional reading

1. McMullen Jr RJ, Millichamp NJ, Pirie CG. Ophthalmic Photography. In: Veterinary Ophthalmology, 5th edition. Gelatt KN, Gilger BC, Kern TJ, editors. John Wiley & Sons, Inc., Ames, Iowa, USA 2013, 729-789.

2. McMullen Jr RJ., Clode AB, Gilger BC. Infrared digital imaging of the equine anterior segment. Veterinary Ophthalmology 2009; 12:125-131.

3. Dwyer Ann. How to take digital photographs of equine eyes in practice. Imaging 2010; 56:228-237.

4. Kanemaki N, Inaniwa K, Terakado K, Kawarai S and Ichikawa Y. Fundus photography with smartphone in indirect ophthalmoscopy in dogs and cats. Veterinary Ophthalmology 2016; 20:280-284.

5. McMullen Jr RJ, Davidson MG, Gilger BC. The effect of 1% tropicamide-induced mydriasis and cycloplegia on spherical refraction of the adult horse. Veterinary Ophthalmology 2014; 17:120-125.