Eye Examination Techniques in Horses

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Basic Instruments
How to tell the potential of vision?

**PLRs** (retina, CN 2, chiasm, optic tracts, midbrain, CN 3, and iris sphincter muscle)

**FLASHLIGHT TEST** (subcortical)
Indirect PLR
Crude Tests for Vision

1. Counting Fingers
2. Hand Motion (Menace Reflex)
   - Calculates to 20/20,000 on the Snellen eye chart!!
3. Light perception
4. No light perception
2. Dazzle Reflex: Light Perception

- A bright light source (SL-15) correlates to a good ERG 94% of the time.
- A dim light source (pen light) agreed 62.5% of the time with the ERG.
Visual Field

Binocular vision 65°

Binocular vision 120°

60°

170°

Blind spots

RIGHT EYE

LEFT EYE

60°

95°
Visual Field

Human field of vision
Visual Field

Horse field of vision

Human field of vision
Equine Color Vision
Equine Color Vision

Colors appear ‘washed out’
Equine: Regional Nerve Blocks

A. Akinesia: CN 7

B. Sensory Analgesia: CN 5
Equine: Regional Nerve Blocks

A. Akinesia: CN 7

B. Sensory Analgesia: CN 5
Motor block
Sensory block to the upper lid
There are really 2 ophthalmic diseases!!

Corneal ulcers

Everything else!!
Early Clinical Sign of Eye Problems

Upper lashes pointed down may indicate eye pain. (not in all ponies!)

Clinical signs may be minor in early stages.

Lash position returns to normal when the pain is gone.
Schirmer tear test
- 19-29 mm wetting/min
- not a linear test
Scraping for cytology and Cultures

- The cultures should be done first
- Cytology: use topical anesthetics and the handle end of a scalpel blade
- Deep corneal scrapings, at the edge and base of the ulcer, to detect bacteria and fungal hyphae

- Superficial swabbing cannot be expected to yield fungi in a high percentage of cases.
Topical Anesthetics

- Diagnostic use only.
- Not to be prescribed.
- Toxic to corneal epithelium.
- Two drops of proparacaine last up to 25 minutes in dogs.
  - 1 drop = 15 minutes.
  - Duration of onset is < 1 minute.
  - Refrigerate proparacaine
    - Tetracaine is ok at room temperature
- One drop lasts 5 minutes in cats
Topical Morphine

- 1% morphine sulfate q4hr
- Reduces pain
- No effect on wound healing
Cytology Scraping
Fluorescein: Every eye exhibiting signs of pain should be stained!!

- Detects a corneal epithelial defect or ulcer.
- Cobalt blue filter aids detection of ulcers
Ulcers
Weak fluorescein staining in KCS horse
Erosion is an ulcer with partial epithelial cell loss and weak fluorescein staining.
Seidel’s Test
Tear film breakup time (TFBUT)

In KCS the tear film is unstable.

- Fluorescein is applied.
- The lid is blinked and held open.
- The tear film is observed under cobalt-blue light.
- The time between the last blink and appearance of dark spots in the tear film is recorded.

TFBUT of 10 seconds or less is consistent with KCS.
Rose bengal

- Tear film integrity

- Mucin layer blocks RB
Stain Use/Order

- **Fluorescein stain first. Identifies ulcers if +.**

- **Rose bengal stain second.**
  - Rose bengal retention indicates tear film instability.
    - Mucin tear layer blocks RB staining
    - At risk of fungal colonization/invasion
    - KCS
    - Viral keratitis
  - Rose bengal stains exposed epithelial cells, mucous and stroma (slow absorption)
    - Not a good prognosis if FL+ and RB+

- **Tear Film Breakup Time in RB+ eyes**
The reduced corneal sensitivity in neonatal foals may partially explain the lack of clinical signs in sick neonates with corneal ulcers.

- Most to least sensitive:
  - Humans > healthy foals > adult horses > sick foals > cat > dog > rabbit
Corneal “Colors”

- White cornea: abscess or necrosis
- Blue cornea: edema
- Red cornea: vessels
  - Superficial (tree-like) and deep vessels (brush).
  - Depth of anterior chamber and iris color.
Dark is bad
Iris Color Change

- Uveitis
- Neoplasia (melanoma)
- Icterus
- Hemorrhage
Pupil Size

- Pupil size is educational
  - Pupils are normally larger in the dark and smaller in the light.
- Large pupils
  - Glaucoma
  - Retinal and optic nerve disease
- Small pupils
  - Uveitis
- **Mydriatics**
  - tropicamide lasts 4-6 hrs
  - atropine lasts 14 days
    - Normal horse eye
  - phenylephrine 2.5%

Mydriasis
“Aqueous flare" is a sign of uveitis.

It is protein from leaky iris blood vessels.
Handheld Slitlamps

Slitlamps and flare
Endothelium

Epithelium

3 mm diameter stromal abscess
Tonopen

• 23.3 ± 6.9 mmHg (range in the horse is up to 37 mmHg!!)
  Manometry determined IOP = (1.38 X Tonopen IOP) + 2.3 mmHg

• Head should be up when measuring IOP (87% increased when down)
  • Up: ~ 17.5 mmHg; Down: ~25.7 mmHg
Tonopen
The Angle

Closed

Open
The lens
- cataracts
- nuclear sclerosis
- lens position

What about the pupil and cataracts?
Nuclear Sclerosis

- 8-10 years of age
- Lens becomes dehydrated and cloudy with age
Lens Luxation
Examine the fundus with a bright light, indirect lens, and direct ophthalmoscope.

- indirect technique first (low magnification)
- direct technique last (high magnification)
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