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Equine Foot Instructional Model ALE

Context: The equine hoof is a complex set of structures that enables horses to ambulate over just about any kind of terrain, conserve energy, and be very agile and athletic. In this learning activity you will work in groups to identify the various structures within the equine foot and assemble them in order. You then will answer several questions about the function of many of these structures.

Learning Objectives

By the end of the session, you should be able to:

1. I**dentify the external features and internal structures of the foot**
   Why: so that you are able to communicate effectively with colleagues, farriers and clients about your patients' care and complete medical records accurately.

2. **Demonstrate & explain the topographical relationships between the various structures of the foot.**
   Why: so you are able to interpret radiographs, MR and CT scans of the foot, and communicate findings to a colleague, farrier or client.

3. **Describe how the structures of the hoof work together to support the weight of the horse.**
   Why: so you are able to describe to clients, farriers or colleagues how the structures of the hoof mitigate physical forces in a healthy animal.

4. **Demonstrate the landing and breakover pattern of the equine foot and the role each structure plays during ambulation.**
   Why: so you are able to identify and incorporate treatments that mitigate physical forces as needed to treat diseases of the foot in your equine patients.

5. **Describe & evaluate the physical effects of various stages of laminitis (pathology) on the neurovascular tissues, dermal layers and distal phalanx within the equine hoof.**
   Why: so that you are able to use clinical reasoning to determine best treatment modalities based on your understanding of anatomy and clinical findings (case-based), and describe to colleagues, farriers and clientele how these treatments mitigate the deleterious effects of various disease processes that occur in the equine foot.

Active Learning Instructions

1. Identify the following structures of the hoof model as you disassemble it:

- ☐ Coronary band (not present, but should be able to define its location)
- ☐ Hoof regions
  - ☐ Quarter
  - ☐ Heel
  - ☐ Bulbs of heel
  - ☐ Toe
- ☐ Epidermal components (insensitive)
  - ☐ Wall
  - ☐ Bars
  - ☐ Frog
  - ☐ White line
  - ☐ Sole
- ☐ Layers of the hoof wall
  - ☐ Stratum externum
  - ☐ Periople
  - ☐ Stratum medium
  - ☐ Stratum internum
  - ☐ Stratum basale (exists at the cellular level so is not visible- define its location)
  - ☐ Basement membrane (exists at the cellular level so is not visible- define its location
- ☐ Dermal components (sensitive)
  - ☐ Perioplic corium
  - ☐ Coronary corium
  - ☐ Frog corium
  - ☐ Sole corium
  - ☐ Laminar corium
  - ☐ Primary laminae
    - ☐ Secondary laminae (exists at the cellular level/ is not visible)
- ☐ Bones & bony structures (also review common names of bones)
  - ☐ Proximal, middle & distal phalanx
    - ☐ Navicular bone
    - ☐ Extensor process
- ☐ Joints (also review common names of joints)
  - ☐ Proximal interphalangeal
  - ☐ Distal interphalangeal
- ☐ Tendons. ligaments & soft tissue structures (know attachment sites of tendons)
  - ☐ Tendon of superficial digital flexor
  - ☐ Tendon of deep digital flexor
  - ☐ Tendon of the long and/or common digital extensor
  - ☐ Navicular bursa
  - ☐ Lateral cartilages
  - ☐ Digital cushion
  - ☐ Flexor retinaculum

- ☐ Impar ligament (not present, but should be able to identify its location)

2. Using the waxed, red, and blue strings and the bone cast of the digit provided, place the following arteries & veins in their proper location for both a forelimb and a hindlimb.
    - ☐ Arteries & veins of the hoof
        - ☐ Medial & lateral plantar digital arteries
        - ☐ Medial and lateral palmar digital arteries
        - ☐ Veins (satellite to arteries and nerves (neurovascular bundles)

3. Using the waxed, yellow string and the bone cast of the digit provided, place the following nerves in their proper location for both a forelimb and a hindlimb.
    - ☐ Nerves of the hoof (identify forelimb versus hindlimb nerves)
    - ☐ Medial & lateral dorsal metatarsal nerves
    - ☐ Dorsal branch of the medial & lateral plantar digital nerves
    - ☐ Dorsal branch of the medial & lateral palmar digital nerves
    - ☐ Lateral & medial plantar digital nerves
    - ☐ Lateral & medial palmar digital nerves

4. Reassemble the model, associating structure & location to function.

5. Demonstrate the landing and breakover pattern of the equine foot.

6. Complete all learning objectives listed above.

In-class Reflection

1. What does it mean to be sensitive or insensitive regarding the dermis and epidermis of the equine hoof?

2. What happens to the lateral cartilages as a horse ages? What are they referred to once this change occurs?

3. What is the importance of the digital cushion?

4. What is the specific action of the common and long digital extensor tendons at each of the joints found on this model? What about the superficial and deep digital flexor tendons? Be specific.

5. Which tendon is responsible for rotation of the distal phalanx in cases of laminitis? How/why does that rotation occur? Be specific.

6. Why is it important to be able to identify the various regions of the hoof?

7. What is unique about the laminae of the horse?

8. How are impact forces mitigated in the equine foot?

9. Inflammation in the laminae results in several deleterious results. Follow normal flow of blood in and out of the equine foot using the terminology above. What happens to that flow, in order, during the disease processes associated with laminitis. What role do the veins play in laminitis?