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Circulation & Respiration of the Equine Distal Limb & Foot

Context

The equine distal limb consists of a complex set of structures that enables horses to ambulate over most surfaces, conserve energy, and be athletic despite their large size. Specifically, the arterial supply of oxygen and nutrients to the capillary beds and venous return of waste products and toxins maintains tissue health and, ultimately, supports the fitness and performance capacity of a horse. Disruptions to this system result in disease, pain, and loss of productivity. Communication with clients around these concepts is essential to enacting effective treatment plans, improving the quality of life for your equine patients and returning them to normal function.

Learning Outcomes

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

- ☐ Identify the crucial anatomical features of the equine distal limb to include the location of pulse points.
- ☐ Explain what it means to be sensitive or insensitive regarding the dermis and epidermis of the equine hoof.
- ☐ Describe the main route for arterial supply from the heart to the toe.
- ☐ Describe the main route for venous return from the toe to the heart.
- ☐ Explain the importance of the digital cushion with regard to circulation within the equine foot.
- ☐ Predict how circulation within the foot is negatively impacted by the inflammatory processes associated with laminitis.

Criteria for Success

1. Use resources effectively to complete all learning outcomes.
2. Meet all expectations for the learning community during ALE participation.
3. Complete the Connect section.
4. Devise a plan to define and resolve points of confusion on your own.

Active Learning Instructions

1. Identify the following structures of the distal limb model as you disassemble it:
    - ☐ Epidermis/hoof wall (insensitive)
    - ☐ Dermis/corium (sensitive)
    - ☐ Tendons, ligaments & soft tissue structures
        - ☐ Distal tendon of superficial digital flexor (SDF)
        - ☐ Distal tendon of deep digital flexor (DDF)
        - ☐ Distal tendon of the long or common digital extensor
        - ☐ Suspensory ligament (Interosseous ligament)
        - ☐ Medial & lateral extensor branches of the interosseous ligament
        - ☐ Distal sesamoidean ligaments

- ☐ Lateral cartilages
- ☐ Digital cushion
- ☐ Navicular bursa

- ☐ Bones & bony structures
  - ☐ Cannon bone (metacarpal/metatarsal 3)
  - ☐ Splint bones (metacarpals/metatarsals 2 & 4)
    - ☐ Buttons
  - ☐ Medial & lateral proximal sesamoids
  - ☐ Long pastern, short pastern & coffin bones (proximal [P1], middle [P2] & distal [P3] phalanges)
    - ☐ Extensor process of P3
  - ☐ Navicular bone (distal sesamoid)

- ☐ Joints (do not disarticulate the joints- leave collateral ligaments intact)
  - ☐ Metacarpophalangeal/metatarsophalangeal (fetlock) joint
  - ☐ Proximal interphalangeal (pastern) joint
  - ☐ Distal interphalangeal (coffin) joint

2. Using the crafting supplies provided, create the bilateral arterial supply from the proximal cannon bone to the toe of the forelimb (assume it is a right forelimb), then the hindlimb (assume it is a left hindlimb). Remember that arteries are satellite to veins and nerves.

- ☐ Arteries
  - ☐ Dorsal pedal artery (hindlimb)
  - ☐ Dorsal metatarsal artery (hindlimb)
  - ☐ Medial & lateral palmar/plantar arteries
  - ☐ Medial & lateral palmar/plantar digital arteries

3. Using the crafting supplies provided, create the venous return from the toe to the proximal cannon bone of the forelimb, then the hindlimb.

- ☐ Veins
  - ☐ Cephalic vein (forelimb)
  - ☐ Accessory cephalic vein (forelimb)

4. Reassemble the model around the vasculature.

Connect

1. Complete all learning outcomes listed above.
2. Describe how the structures of the equine distal limb mitigate physical forces when weight bearing.
3. Describe how the vasculature of the equine limb differs from the canine distal limb.
