School of Veterinary Medicine
UNIVERSITY OF WISCONSIN-MADISON

Primary author: Dr. McLean Gunderson
Collaborators: Dr. Jessica Rippe
Dr. Karen Hershberger

Cognition & Senses 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. Ninety percent of lamenesses in the horse are isolated to the foot. However, the structures of the distal limb are also a common site for injury which manifests as lameness. Because of this, regional nerve blocks (diagnostic analgesia) are often performed to isolate and identify the specific region that is the source of pain. It is essential that veterinary professionals are able to identify structures, describe their normal functions, and define the topographic relationships of structures found in the distal limb. Communication with clients around these concepts is essential to enacting effective treatment plans, improving the quality of life for your patients and returning them to normal function.

Learning Outcomes

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

- ☐ Identify the crucial anatomical components of the equine distal limb to include innervation.
- ☐ Demonstrate the anatomical landmarks utilized when performing regional nerve blocks.
- ☐ In the context of developmental anatomy, describe how the sensory and motor neurons arrived at their respective locations within the nervous system.
- ☐ Explain what it means to be sensitive or insensitive regarding the epidermis and dermis of the equine hoof.
- ☐ Explain a motor pathway from the brain to P3 naming every structure along the way.
- ☐ Explain a sensory pathway from level of P3 to the brain naming every structure along the way.

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 clear up 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

- ☐ 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

Note: Stop deconstructing the model at this point.

2. The vasculature of the forelimb or the hindlimb between the proximal cannon bone to the toe is in place on the model. One model is of a right forelimb, the other is a left hindlimb. Determine which is which, then **identify** the following structures:
   - ☐ Arteries
     - ☐ Dorsal pedal artery (hindlimb)
     - ☐ Dorsal metatarsal artery (hindlimb)
     - ☐ Medial & lateral palmar/plantar arteries
     - ☐ Medial & lateral palmar/plantar digital arteries
   - ☐ Veins
     - ☐ Cephalic vein (forelimb)
     - ☐ Accessory cephalic vein (forelimb)

3. Using the crafting supplies provided, create the nervous system supply from the proximal cannon bone to the toe of the forelimb (assume it is a right forelimb), then complete the hindlimb (assume it is a left hindlimb).
   - ☐ Nerves of the distal forelimb:
     - ☐ Dorsal branch of the ulnar nerve
     - ☐ Musculocutaneous nerve
     - ☐ Medial palmar nerve
       - ☐ Communicating branch
       - ☐ Medial palmar digital nerve
       - ☐ Dorsal branch of the medial palmar digital nerve
     - ☐ Lateral palmar nerve
       - ☐ Medial & lateral palmar metacarpal nerves
       - ☐ Lateral palmar digital nerve
       - ☐ Dorsal branch of the lateral palmar digital nerve

- ☐ Nerves of the distal hindlimb:
  - ☐ Deep peroneal nerve
    - ☐ Medial & lateral dorsal metatarsal nerves
  - ☐ Superficial peroneal nerve
  - ☐ Saphenous nerve
  - ☐ Medial plantar nerve
    - ☐ Communicating branch
    - ☐ Medial plantar digital nerve
    - ☐ Dorsal branch of the medial plantar digital nerves
  - ☐ Lateral plantar nerve
    - ☐ Medial & lateral plantar metatarsal nerves
    - ☐ Lateral plantar digital nerve
    - ☐ Dorsal branch of the lateral digital nerve

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

Connect

1. Complete all learning outcomes listed above.
2. Describe the main route for arterial supply from the heart to the toe.
3. Describe the main route for venous return from the toe to the heart.
4. Describe how the nerves of the equine distal limb differs from the canine distal limb.
