



AAEP Focus on Lameness

At the AAEP convention, world-renowned researchers enlighten a large gathering on the most recent advances in lameness diagnostics and treatment

Lameness—it's the bane of your existence, whether you're a racehorse trainer, owner, or even a fan. It keeps horses off the training track, out of races, in and out of vet clinics, and in the stalls where they eat their heads off and lose fitness. We're always looking for ways to prevent and treat lameness, and researchers are stepping up to the plate.

Lameness research was well-represented at the American Association of Equine Practitioners convention, held in December in Orlando, Fla., where more than 7,000 veterinarians and other professionals gathered to hear the latest research on equine veterinary topics. Following are reports of several lameness diagnostic and treatment studies from researchers around the world.

LOOKING INSIDE THE LAME FOOT

Two world-renowned practitioners spent a half-day describing the proper use and interpretation of digital radiography (X rays) and magnetic resonance imaging, reporting on recent research and a host of case studies to illustrate their findings. Dr. Sue Dyson, head of clinical orthopedics at the Animal Health Trust in Newmarket, England, and Dr. Kent Allen, owner of the imaging referral facility Virginia Equine Imaging in The Plains, Va., presented the popular session.

Dyson described the objectives of the presentation as follows: to present the results of recent studies, discuss the art and science of lameness diagnosis, provide practical tips, show some high-quality images, and demonstrate that sophisticated technology is not always required.

For example, she commented: "It is important to recognize that computerized or digital radiography does not necessarily equate with better. Excellent quality conventional radiographs can be vastly superior to poor quality digital images. Attention to detail is crucial to achieve excellent quality images, whichever technique is used. However, excellent quality computerized or digital images can potentially yield more information than conventional images and enhance our diagnostic capabilities."

PALMAR PROCESS FRACTURES OF THE COFFIN BONE

This term describes a fracture of the rear "wings" of the coffin bone; the inside (medial) wing, outside (lateral) wing, or both can be fractured. An Animal Health



Researchers at the convention focus on the proper use and interpretation of X rays



Trust study of 22 horses (eventers, show jumpers, and general purpose horses with an average age of 8.4 years) found that the medial palmar process (back part of the wing) was more often affected, accounting for 81% of fractures. Owners of many of the horses had not observed a sudden onset of acute lameness, but horses were mildly or moderately lame upon examination at the Animal Health Trust—less severe than one usually associates with fractures, Dyson noted.

She reported that lameness was worse when the horses were worked in a circle, especially on hard ground with the lame limb on the inside. Conventional radiograph views showed no abnormalities in half of the horses, but oblique (off-angle) views were able to show the coffin bone wing fractures.

“This highlights the need for routine use of oblique projections when evaluating horses with foot pain,” she advised.

She also noted that nuclear scintigraphy or bone scanning identified bone remodeling at the fracture site in all 12 horses that were scanned. Scintigraphy is a metabolic imaging modality that uses blood flow and bone remodeling to produce an image. A radioactive compound is injected intravenously and circulates throughout the horse, localizing in areas of injury and active bone remodeling. The radioactivity is measured, producing an image.

“Nuclear scintigraphy can be useful to highlight the potential presence of a fracture and prompt acquisition of different radiographic views to identify a fracture,” she said.

However, scintigraphy is not usually es-

Digital Flexor Tendon Sheath Nerve Blocks

Diagnosing lameness in horses has often been termed an art and a science, in part because the use and interpretation of nerve blocks to isolate sources of pain are more art than exact science. Several blocks have been found to numb more structures than scientists previously thought based on research performed at Auburn University. This, in turn, impacts the interpretation of lameness that is attenuated by those blocks. Dr. Justin Harper, a resident in equine surgery at Auburn, presented the results of a study on analgesia of the digital flexor tendon sheath.

The study was designed to answer one question: Is analgesia of the DFTS specific, only desensitizing the DFTS and its contents, or is it nonspecific, blocking more structures distal to (lower than) or outside the confines of the sheath itself?

“Analgesia of the DFTS using the palmar axial sesamoidean approach does not interfere with pain originating from the sole, coffin joint, or navicular bursa if evaluated within 20 minutes,” Harper concluded. “So, if pain is attenuated with the DFTS block, chances are the pain is in the deep digital flexor tendon.”

Diagnosing Upper Cannon Injuries

Pain originating in the upper cannon bone area, just below the knee or hock, is common in all types of equine athletes. Determining exactly what structure is injured can be difficult; some injuries can only be seen with high-field magnetic resonance imaging. Dr. Matthew Brokken, clinical assistant professor of veterinary clinical sciences at the University of Florida, described a Washington State University study of lameness originating in this area.

“Detection of abnormalities, specifically desmitis (ligament inflammation) of the inferior check ligament and proximal suspensory ligament, has not been possible in some horses (via radiography or X rays, ultrasound, or nuclear scintigraphy),” he explained.

“The use of MRI in this area allowed an accurate diagnosis in 44 of 45 horses (in his study),” Brokken reported. “Having an accurate diagnosis enabled appropriate treatment in these horses, which helped a high percentage of them to return to their intended use.”

“It is interesting to note that 59% of horses that had lameness localized to the proximal metacarpal region (forelimb) had ICL damage,” noted Brokken. “Previously it was thought that horses that block to the proximal metacarpal region usually have a proximal suspensory injury,” but these results prove that this isn’t always the case.

Treatments ranged from a six-month rest and rehabilitation program (33 horses) to surgery, injections, and various combinations thereof.

“In conclusion, lameness localized to the proximal metacarpal and metatarsal region has been a diagnostic challenge,” Brokken concluded. “Traditional imaging modalities don’t always yield an accurate diagnosis. High field strength MRI should be considered in performance horses with lameness localized in the proximal metacarpal and metatarsal areas.”

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sential for diagnosis.

Thirteen of the 22 horses became sound, three improved but not to complete soundness at their previous level of work, and two healed but had lameness from other injuries, for an overall successful recovery rate of 81%. Alteration of bone architecture in some horses suggested that this can be a repetitive stress injury, Dyson commented.

The location of the palmar process fracture and whether it affects the joint surface (an articular fracture) doesn’t appear to affect the prognosis in sport horses, she said. However, concurrent injury of the collateral ligament that stabilizes the coffin joint might lead to increased bone instability and delayed union of the fracture.

MORE ON THE PALMAR PROCESSES

Dyson also described a study that compared radiography, nuclear scintigraphy, and MRI to evaluate the palmar processes of 258 horses with front foot pain, in part to determine if pedal osteitis (inflamma-

tion of the coffin bone) is a legitimate diagnosis. "I've always been somewhat reluctant to use (the pedal osteitis diagnosis) unless there's evidence of IRU (increased radiopharmaceutical uptake, indicative of bone remodeling, seen on a bone scan). I still ask, is it necessarily contributing to pain and lameness? I tend to say it's the diagnosis of the diagnostically destitute," she said with a grin.

Focal moderate to intense IRU was seen in 2.8% of medial processes and 1.2% of lateral ones. Radiographs noted multiple radiolucent areas (of less dense bone) in palmar processes in 21.1% of feet, new bone on the ventral (lower) aspect of palmar processes in 11.8% of feet, and palmar (rearward) elongation of the palmar pro-



Scintigraphy can be useful to detect the presence of a fracture

cesses in 4.6% of feet. No correlation between sole depth and IRU was found, nor was there correlation between the angle of the coffin bone with the ground (solar angle or palmar angle) and IRU. Veterinarians found more abnormalities in medial palmar processes with MRI than scintigraphy, and MRI grade was significantly correlated with scintigraphy grade.

"Focal increased radiopharmaceutical uptake in a palmar process of the distal phalanx is not common, but it occurs most frequently in the medial palmar process," Dyson summarized.

"There's a huge variation in radiographic, scintigraphic, and MRI appearance of palmar processes," she continued. "Focal IRU can be seen with MRI abnormalities associated with lameness or inciden-

Shoulder Blade Stress Fractures

Although it's not a common injury, fracture of the scapula or shoulder blade does occur in horses and causes notable lameness. Dr. Stuart Vallance of Shotton & Byers Equine Veterinary Services in Surrey, England, presented a retrospective study of eight Thoroughbreds afflicted with this injury—the first study of this injury known to the authors.

"Stress or fatigue fractures are failures of normal integrity of cortical bone secondary to repetitive stress," he explained. "Repetitive bone loading induces stress remodeling (where bone is initially broken down, then built back stronger to handle the stress). But there is a fine line between the rate of damage and the rate of repair. Stress fractures occur when that rate of damage exceeds repair. They tend to occur in repeatable predilection sites in the horse, commonly in the cannon bone, humerus, tibia, pelvis, and vertebrae.

"Stress fractures are recognized to predispose a horse to complete fractures, which cause wastage and fatalities," he went on. "Preventive training regimens include short bursts of intense exercise (faster than 16 meters per second). Risk factors for some types of stress fractures include large distances of low-intensity exercise and extended rest periods."

Diagnosing stress fractures is tough, he noted. Local anesthesia (nerve blocks) is limited due to most stress fractures occurring in the upper limb, radiographic findings are often subtle and not indicative of active bone lesions, ultrasound examination isn't 100% sensitive, and magnetic resonance imaging can't image that high on the horse. Nuclear scintigraphy (bone scan) to show areas of active bone remodeling is the best diagnostic tool.

In the study, eight horses were identified to be Grades 2-4 out of 5 lame at the trot. All were in race training at the onset of lameness, and two had raced. Half of them had been rested for six to 12 months before lameness began. Only two showed clinical pain in the shoulder area (based on scapular neck palpation and resistance to upper limb abduction, or movement of the limb away from the body).

All eight showed positive scintigraphy findings (there were areas of active bone remodeling or "hot spots"). The fractures tended to be in two locations: on the mid-distal spine of the scapula (three horses) or on the mid-distal scapula supraspinous fossa (three horses). Two horses had fractures in both locations.

All cases had restricted exercise for three months, and six returned to racing after an average of 9.8 months and made an average of 13 starts. Prize money per start after injury went down slightly (from an average of \$3,900 to \$3,446), and two horses experienced recurrence of the fracture.

"Bone-phase nuclear scintigraphy was integral to the diagnosis, and ultrasonography may be beneficial to image the fracture," Vallance concluded. "Conservative management carries a good prognosis for return to racing, but recurrence is not uncommon."

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tal MRI abnormalities (which are present, but not causing lameness). Abnormalities are more frequent in lame limbs, but are they contributing to the abnormal loading or a consequence of it?

The clinical significance of these lesions has to be established. Most horses present with concurrent lesions that could also cause lameness.

"So is pedal osteitis a legitimate diagnosis? Can it contribute to pain and lameness?" she asked. "Yes, but in no horse was this the primary cause of lameness in this study."

"So pedal osteitis is still the trash can diagnosis?" Allen asked with a smile.

"Yes, I think it is," answered Dyson.

SCINTIGRAPHY FOR NAVICULAR DISEASE AND SOFT TISSUE INJURIES

Out of 264 horses with front foot pain, scintigraphic images of 36.6% of their limbs showed IRU on a bone scan in the navicular bone, Dyson noted. Scintigraphy and MRI grades were highly correlated.

"It was concluded that positive nuclear scintigraphic results are good predictors of injury or disease of the navicular bone; however, a negative scintigraphic result does not preclude significant disease of the navicular bone," she said. "It appears

that if bone necrosis is the predominant pathological process, IRU may be normal. End-stage sclerosis (bone hardening) is also not associated with IRU."

The same 264 horses' scintigraphic images were also evaluated to see any IRU associated with soft tissue injuries. The most common soft tissue injuries with IRU were in the deep digital flexor tendon (13% of limbs) and in the insertion of that tendon on the coffin bone (14.3% of limbs).

"Positive nuclear scintigraphic results are good predictors of injury or disease of the deep digital flexor tendon and collateral ligaments of the distal interphalangeal joint (coffin joint), irrespective of the anatomical location of the lesion in the tendon or ligament," Dyson concluded. "But a negative scintigraphic result does not preclude significant injuries. However, in combination with MRI it can tell us something about the disease process. Nuclear scintigraphy was not useful for detecting lesions of the distal sesamoid-ean impar ligament."

MRI INVESTIGATION

In those 264 horses with foot pain, MRI showed that 82.6% of limbs had deep digital flexor tendon lesions, most often near the collateral sesamoid-ean ligament (59.4%) and navicular bone (59%). Many of these lesions were small and not clinically significant, she noted.

Lesions at the level of the first phalanx or long pastern bone (just below the fetlock) tended to be core lesions (90.3%), while the aforementioned lower lesions tended to be sagittal (front to back) splits and dorsal (upper surface) abrasions. Lesions of the deep digital flexor tendon and pathology in the navicular bone were associated.

Lesions of the distal sesamoid-ean impar ligament and collateral sesamoid-ean ligament were less common (38.2% and 10.5%), but both were also associated with navicular bone abnormalities.

"There are close interactions between injuries of the components of the podotrochlear apparatus, the deep digital flexor tendon, the navicular bursa, and the distal interphalangeal joint," Dyson concluded. "The navicular bone can't be considered in isolation. Core lesions of the deep digital flexor tendon at the level of the proximal phalanx may have a different etiology (cause) than lesions occurring farther distally."

TAKE-HOME MESSAGE

Allen said, "We (imaging referral practices) can't promise a full lameness work-up will be cheap, but we'll stay on it until we have a diagnosis. There's a real need for this in this country; too often a case doesn't get a good work-up and there's real value to doing this." □

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