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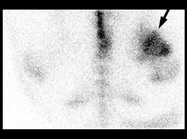
A Review of Imaging Options for Subtle Lamenesses



Nuclear scintigraphy (bone scan) uses a radioactive source and a binding agent to identify areas where osteoblasts (bone-forming cells) are turning over (healing) bone. Here, it shows a hip fracture.

Photo: Anthony Pease, DVM, MS, Dipl. ACVR

Ten years ago, if your horse turned up lame, chances are the problem would be obvious and the diagnosis easy. Today's more astute horse owner is far more in tune with his or her horse, and we're seeing more subtle lamenesses stemming from all parts of the body. Unfortunately, this can make diagnosing today's lame horse a bit trickier. That's where nuclear medicine comes in.

During the 2014 American Association of Equine Practitioners Convention, held Dec. 6-10 in Salt Lake City, Utah, Anthony Pease, DVM, MS, Dipl. ACVR, section chief of diagnostic imaging at Michigan State University's College of Veterinary Medicine, in East Lansing, described the current diagnostic imaging environment for horses.

"The purpose of this review is to discuss the use of radiographs, nuclear medicine, and standing MRI in the equine patient and describe the limitations and methods to overcome these limitations," Pease began.

Radiographs (X-rays) work by sending radiation through bone to a detector on the other side of the horse, allowing the veterinarian to view any fracture in high contrast.

Nuclear scintigraphy (bone scan) uses a radioactive source and a binding agent to identify areas where osteoblasts (bone-forming cells) are turning over (healing) bone. It can show either bone uptake or increased blood flow.

Standing MRI has recently "taken the equine market by storm," Pease said, and uses a magnetic field and radio waves to produce detailed images of tendons and ligaments, bone edema, and even fractures.

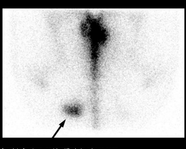
Armed with these high-tech tools, veterinarians should be able to diagnose even the most subtle lameness, he said. But, "currently there seems to be a lack of understanding of some of these modalities and, therefore, they are not used to their full potential," Pease said. So he described several examples of challenging lameness diagnoses and how he applied various imaging techniques to pinpoint each horse's issue.

Case 1 A 23-year-old mare displayed left pelvic limb lameness. Pease said X rays showed one strange-looking area, but nuclear scintigraphy revealed a hot spot where bone was remodeling. Her diagnosis was osteoarthritis in an uncommonly affected hock joint called the talocalcaneal joint.

Pease explained that scintigraphy is advantageous in cases such as this: "It shows you where bone currently turns over versus X rays, where you don't know if what you're seeing is actually causing the horse pain or how long it has been there."

This horse, for instance, was already receiving treatment in the more commonly affected hock joints with no improvement. Once Pease performed a bone scan, he said he could determine exactly where the lameness originated and adjust treatment accordingly.

Case 2: A 7-year-old mare took a spill and landed on her left hind end. She had since displayed lameness and muscle atrophy (wasting). Because radiographing the pelvic region is very difficult, if not impossible, Pease performed a bone scan that revealed increased activity in the caudal (back) portion of the pelvis called the ischium. He then used ultrasound to evaluate that specific area. "The problem with ultrasound is that it is a very focused image, so you need to know exactly where to look," he said.



A pelvic fracture, as identified via a bone scan.

Photo: Anthony Pease, DVM, MS, Dipl. ACVR

In pelvic fracture cases, such as this, Pease said you can repeat bone scans over time to observe changes in blood flow and fracture activity levels. "You can use serial scintigraphy to evaluate vascularization. It's easy and relatively fast," he said. "You might see increased (blood flow) activity as bone heals or regions without activity if you have dead bone, which can get infected."

Case 3 An adult horse presented with a hard mass in his mouth, on his mandible (jaw). Pease said radiographs showed a curious area on the jaw that looked like bone loss, and nuclear scintigraphy revealed a huge hot spot there. Scintigraphy helped to determine how large the lesion was, Pease said. After taking a biopsy, he diagnosed the horse with squamous cell carcinoma with a secondary bone lesion on the mandible.

Pease used this case as an example of how scintigraphy can help localize and isolate a problem, saving veterinarians and owners the time and money spent blindly taking radiographs.

He shared several more case examples and ended with some diagnostic advice, including:

- Beware of overinterpretation, particularly with subtle lamenesses.
- Use multiple imaging modalities, particularly when diagnosing subtle lesions. "Multiple modalities give us more credence and confidence in what we see," he said.
- When interpreting standing MRI results, remember that you're limited by magnetic field strength (the size and severity of the lesion must be such that these low-field systems can detect it) and patient motion
- When interpreting scintigraphy results, remember that bone turnover can occur for many reasons (e.g., foals normally exhibit a high degree of osteoblast activity; fractures can continue to heal for up to three years post-injury, etc.).

All this being said, "researchers and clinicians are constantly studying these modalities and continue to improve our understanding of how best to use and interpret the images," Pease concluded. "In the realm of noninvasive imaging, the future looks bright and the availability to start critically evaluating treatments is just around the corner."