Ultrasound applications offer new options for equine DVMs

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Diagnostick ultrasound has become an integral and necessary part of the equine practice. Diagnostic imaging is now a major part of the clinical examination of lame horses. The quality of these images improves almost daily. The scope of equine ultrasound is endless. It is limited only by your imagination and knowledge of the horse’s anatomy.

Musculoskeletal system

One of the earliest and most common indications for ultrasound is in the lame horse for evaluation of the musculoskeletal system. Ultrasonography is very useful in the diagnosis and management of flexor tendon and ligament injuries. The structures of the lower leg can easily be evaluated and measured. Serial ultrasound examinations can help determine the appropriate rehabilitation program for performance horses to reduce the risk of further soft tissue injury. In particular, the structures that can be evaluated include but are not limited to the superficial digital flexor tendon, the deep digital flexor tendon, the suspensory ligament, the distal check ligament, the palmar and plantar annular ligaments, the distal sesamoidean ligaments, the collateral ligaments and the associated synovial structures.

Ultrasound can also be used to evaluate local swelling associated with lameness. Ultrasound of joints can also provide immeasurable information with respect to lameness isolated by regional or intrasynovial nerve blocks. Using the appropriate probe and positioning, the sonographer can obtain excellent images of the shoulder, elbow, carpus, fetlock, pastern, coffin joint, coxofemoral joint, stifle and hock. The skin over the area to be examined should be clipped with No. 40 surgical clipper blades and the skin should be thoroughly cleaned before applying ultrasound gel. If you are imaging the foot it is helpful to trim away as much of the frog as possible and soak the foot in warm water for 15 to 20 minutes prior to the examination (Photo 1).
The back

The equine back is another common site for pain in the athlete and it is very difficult to image and evaluate. Ultrasound can be used to evaluate the cervical spine, the thoracic spine and the lumbar area.

Reproduction

Ultrasonography has revolutionized the equine reproductive practice in the last few decades. Ultrasound is not only used for evaluation of pregnancy in the mare, but also for fetal sexing, infertility in the mare and the stallion, placentitis and fetal growth. Placentitis can be diagnosed remarkably early in problem mares by ultrasound of the cervical area looking for thickening and premature separation of the placenta from the uterine wall. This is done by a rectal ultrasound examination. The placenta can also be imaged trans-abdominally with a 2.0 to 3.5 MHz probe.

Neonatology has also progressed in the use of ultrasonography. The thorax and the abdomen are easily examined with the simplest of equipment due to the relatively thin body wall and small size. A linear rectal probe used in reproduction can be used as well as a convex 3.5 to 5 MHz probe. Fractured ribs, atelectasis, pneumonia, pleural fluid, uroperitoneum, ruptured bladder, septic umbilicus, enteritis, ileus, and intussusception (Image 1) can all be imaged quickly in the field resulting in an earlier diagnosis and earlier treatment of the fragile neonate.

Internal organs

The thorax and the abdomen of the adult can also be evaluated with the ultrasound. The internal organs can be imaged and biopsied with the assistance of the ultrasound to include the kidneys, the liver, spleen and lungs. Horses with colic and diarrhea can be examined with the ultrasound as well looking for changes in the bowel wall thickness, peristalsis, and displaced bowel (Image 2). The lungs can also be imaged to diagnose pneumonia, pneumothorax and pleural fluid earlier than auscultation. Ultrasound of the heart and associated structures is a discipline within itself. Many people in the thoroughbred industry use ultrasound of the heart to predict future performance. The ultrasound image of the heart is measured and given a heart score. Further, pathology of the heart in the equine patient can be diagnosed almost exclusively by ultrasound (Image 3, p. 42).

Bird’s eye view

Pathology of the eye can also be helpful in serious ophthalmic cases. The eyelid is blocked with an auriculopalpebral nerve block and the eye is imaged through the closed eyelid. This is especially beneficial for early detection of a detached retina.

Photo 2: Ultrasound of the pelvis in the standing patient.

Image 2: Ultrasound image of a nephrosplenic entrapment of the large colon.

In Focus

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Equipment selection

A wide range of ultrasound equipment is available today. The type of machine suited to your practice is dependent on the ultrasound needs of you and your patients. There are extremely small portable machines that are useful for basic ultrasound and there are large in-hospital systems with color-flow Doppler capabilities useful for cardiac cases. Along with each machine there is a selection of transducers or probes (Photo 3). Ultrasound transducers convert an electrical voltage into ultrasound energy. The transducers are made of differing frequency. In general, the higher the frequency, the less imaging depth. For example, a 10 MHz probe will get good resolution to approximately 6cm. Likewise, a 2 MHz probe will achieve good resolution to 30cm. High frequency transducers have excellent resolution but poor penetration. The selection of the appropriate transducer for a particular examination depends upon the structure to be evaluated and the distance of that structure from the head of the transducer. Likewise, implementation of ultrasound into your practice can cost $7,000 to $40,000. The cost will depend on the machine, the number of probes, and the accessories such as carts, printers or digital means of capturing the images. The advantages of offering this service to your clients are numerous. As the saying goes, “a picture is worth a thousand words.” It is much easier to convince a client to allow the appropriate stall rest or rehabilitative program when they can see the damage. Furthermore, it is easier to suggest further treatment options and/or referral if they are able to see the condition on an ultrasound image. The key is to be willing to look at any and all body parts with the ultrasound and then educate the clients to the benefits. Be willing to ultrasound the problem area on a follow up examination to assess the progress. For example, a foal with pneumonia can be monitored several times to determine the safest time to stop antibiotic therapy. Ultrasound will also allow earlier diagnosis of varying diseases. It is quick, easy and non-invasive for the patient. Further, the results are instant. The client does not have to wait for laboratory results or radiographic processing.

In Focus

Dr. Rathgeber recently became the first woman partner at Hagyard, Davidson, and McGee where she has been practicing for the last eight years. She focuses her practice to mostly equine lameness with ultrasound, radiology and acupuncture playing major roles. She earned her veterinary degree from the Virginia-Maryland Regional College of Veterinary Medicine (Virginia Tech) and her Ph.D. in veterinary anatomy and locomotion from Washington State University.

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