Imaging Considerations in the Purchase Examination of the Performance Horse

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Completion of the purchase examination often includes various imaging techniques such as endoscopy, radiography, and ultrasonography. Other more advanced techniques such as thermography, scintigraphy, and magnetic resonance imaging may be appropriate in some cases. What to image and what modality is appropriate depends on the information gathered during the physical examination and the horse’s intended discipline. Good repeatable technique with a sense of practicality is essential regardless of the chosen modality. Author’s address: Fairfield Equine Associates, PC, 32 Barnabas Road, Newtown, Connecticut 06470; e-mail: rmitch2074@aol.com. © 2009 AAEP.

1. Introduction
The purchase examination of the performance horse should be a carefully orchestrated and repeatable process. The physical examination may be fairly unremarkable or show a number of possible problems, leaving the examiner with more questions. Complete evaluation of the performance horse normally requires a careful look at those regions of the respiratory and musculoskeletal system most often involved in performance-related problems. Potential problem areas can vary somewhat with the discipline for which the horse is used. Some issues discovered during the physical examination may be better examined using a combination of imaging modalities. The veterinarian is frequently faced with the dilemma of gathering as much information as possible while working within a budget and dealing with time constraints. Therefore, the decision for what imaging techniques to use should be based on professional assessment of the patient and sound economic considerations. In the absence of physical problems or lameness, imaging techniques are for screening and are used to look for abnormalities characteristically seen in horses of that age, breed/discipline, and state of use. In the case of a detected abnormality or lameness, imaging techniques become diagnostic, such as in the case of radiographic evaluation of an extremely sensitive splint callus.

2. Endoscopy
Endoscopy of the upper airway is frequently incorporated in the purchase examination. Many upper airway abnormalities may not be that apparent on physical examination but readily apparent on endoscopic examination. Many upper airway problems may be progressive and lead to significant dysfunction at a later date. A thorough examination for laryngeal function, presence of any abnormal anatomy, or significant evidence of inflammation of the pharyngeal or nasal passages is essential. Any abnormalities should be carefully recorded, and if possible, documented with actual images. Upper airway endoscopy should be offered wherever possi-
Radiography

Almost since the advent of radiology in equine practice, radiographs have been considered a means of enhancing the physical examination for purchase. Radiography allows the examiner to review the skeletal structure for evidence of previous disease or issues that may predispose the horse to future problems related to structure. Problems evident during the physical examination can be more completely evaluated, and occult issues can be recognized. Many clients might be of the opinion that the radiographic examination is more important than the physical exam. This surely is not the case, but good imaging can go a long way toward providing a more complete evaluation of a horse for purchase. Other clients may decline any radiographic examination, but this may result in an incomplete evaluation and should be so noted in the written record. An open conversation with the potential buyer should occur before any radiographic imaging. There should be a discussion regarding the value of such an examination and the information that may be obtained. It is important to convey the understanding that radiographic imaging may not show all orthopedic abnormalities but can sometimes detect other issues not readily apparent in the thorough physical examination.

Good technique is of paramount concern when performing the radiographic examination. Consistency of positioning is essential for reliable and repeatable evaluation of images. This may be the hardest aspect of radiography to teach and consistently execute. New digital radiography equipment, both computed (CR) and direct (DR), allows for a wider range of technique of exposure, but poor images can still be produced; thus, the technician/veterinarian must strive to use good repeatable technique. With the newer DR equipment, because an image is immediately produced, there is little excuse for poor positioning and exposure because the image can simply be repeated. Technique charts can be simpler but are still necessary. Of course, some patients are more cooperative than others, and certain horses can make the examination more complicated. Use of sedation techniques, with owner or agent consent, is appropriate for acquiring a complete set of diagnostic images in some cases. Obviously, consistency with traditional film radiography can be more challenging but every bit as attainable.

A complete working knowledge of radiographic anatomy is also necessary to avoid making issues of normal structures that are erroneously interpreted as lesions. This often is the case in images interpreted by less experienced evaluators. Seeking advice from more experienced colleagues or imaging specialists on unusual findings is a sound practice and can be a useful learning experience.

4. What to Image?

The decision of what to image can be the subject of much debate. Knowledge of the discipline in which the horse is to function is essential to make appropriate decisions related to imaging. With the English sporthorse or western performance horse, certain common lameness issues are known to occur more frequently, and the choice of radiographs should be based on likely probability. Additionally, any skeletal findings during the examination that raise concern should also be evaluated. Thorough radiographic examination may expose old problems that have since resolved but might produce confusion of diagnosis of similar problems in the future. A proximal plantar P1 fragment in a hind fetlock may not be related to a potential diagnosis of hind limb lameness when found in a 10-yr-old jumper if it was known to be there when the horse was 4 yr old. Radiographs may also be used as a factor for predictability in this way as well. Moderate osteoarthritic changes associated with a pastern joint found in today’s examination may carry less significance if known to have been there on radiographs made 2 yr previously.

Imaging just for the sake of making records is not really appropriate. That is to say, don’t just image for no real intent to glean more knowledge. In deciding regions to examine with radiography, it is common to image the front feet in the sport horse. The carpal joint of the racehorse and the event horse is often affected with osteoarthritis; however, this is much less common in show jumpers and dressage horses. As a result, it is much less common to image the carpus of show jumpers and dressage horses as opposed to horses that perform at high speed. On the other hand, jumpers and dressage horses commonly have fetlock-, hock-, and stiflerelated lameness, and it is important to evaluate these regions radiographically. Hock and stifle problems are common in western performance horses as well. It is more frequently recognized today that dressage and jumping horses have primary back and neck problems and that many of these are detectable with radiographic imaging. Areas of palpation sensitivity in the thoraco-lumbar region or reduced neck flexion noted on “carrot-stretch” tests may justify radiographic investigation. Today’s digital systems allow for good diagnostic images of the neck and back even with lower output portable X-ray generators (examples in...
Fig. 1, A and B). The examining veterinarian should consider images of the back and neck if any findings suggest pain or dysfunction in these areas and such equipment is available.6

It is possible that the radiographic examination may produce results that seem inconsistent with the physical examination. Bony lesions may be identified that one would expect to be related to lameness yet the horse appears well. Further radiographic images may be necessary for a more complete evaluation, or other imaging techniques, such as ultrasound or scintigraphy, might need to be used to yield more information about the significance of a radiographic finding. A subsequent second physical examination on a different day may help this process. As mentioned previously, older images of the horse that show the existence of a particular lesion for a number of years may be important for current interpretation.

5. Ultrasonography

As the use of ultrasound has become more commonplace in the evaluation of musculoskeletal problems, its use in the purchase exam has increased. It is not uncommon for a concerned buyer to request that “all limbs have an ultrasound exam.” This request is problematic, just as with radiographic exams, because the understanding and expectations of the buyer may not be on the same level as the examining veterinarian. Because of the vast number of structures that may be evaluated in the horse and because of significant variation in the skill levels of veterinarians performing ultrasound examinations, a clear discussion of expectations with the intended purchaser should occur before any action. It is best to clearly understand client expectations and inform the client of technical limitations before the exam. It may be best to discuss looking at specific structures or areas that raise suspicion based on flexions and palpation as is done in the radiographic examination. If a very complex examination is indicated, it may be best performed by someone who is more experienced in ultrasound evaluation, especially if less routine structures are to be evaluated. Perhaps no exam is indicated at all, but again, the wishes of the buyer should be respected.

When performing the ultrasound examination, the sale horse may present some technical difficulties. Fine haired horses may present few technical problems with the use of warm water and plenty of coupling gel; however, long hair may dramatically reduce the ability to view structures adequately. The seller may be unwilling to allow the horse to be clipped, and this may make the exam impractical, if not impossible. It is better to perform no exam at all than to perform one that is clearly technically inadequate under the guise of a proper exam. Obviously clipping a horse marks “the spot,” but clipping one symmetrically on the other limb only says it was examined but not specifically for what. Consistently following the same practices as in the case of radiography will provide for repeatable examinations and potentially minimize legal liability issues in the future. When performing an ultrasound examination, examination of the contralateral structure is always recommended to provide a means of comparison.

The soft tissue structures of the metacarpal and metatarsal regions are the most commonly examined structures. There is a high incidence of suspensory ligament injury in jumper, dressage, and western performance horses. Similarly, jumpers and event horses often have flexor tendon abnormalities.7 The palmar and plantar pasterns are also frequent sites of tendon and ligament injury and should be evaluated carefully if physical examination sufficiently raises suspicion about these areas.
Suspected joint problems may be more completely evaluated with ultrasound when suspicious findings occur on physical or radiographic examination. Subtle bony abnormalities as well as soft tissue lesions may be more evident than with the radiographic examination. Confusing radiographic findings in an otherwise sound horse may be better evaluated with ultrasound. Evaluation of the deeper structures of the foot related to the navicular bone and deep flexor tendon are but one example.

If, in the course of the examination, local pain or stiffness in the neck is noted, ultrasound examination may be very helpful in evaluating the synovial facets. Back pain may be further evaluated with ultrasound by evaluating structures such as the dorsal spines, supraspinal ligament, and synovial facets.

6. Thermography
Thermal imaging can be a useful screening tool for the purchase examination. For the sport horse, scanning the limbs and back in general with a modern infrared camera can be beneficial and reasonably quick to perform. Early pathology in the distal limb may be detectable as well as foot balance issues that are producing subtle inflammatory changes. Thermographs of the back may indicate deviations in expected patterns that may be further evaluated by other means. Muscle pathology in various regions may be detectable using thermal imaging. Such tools may also be used to monitor resolution of inflammation on subsequent examinations.

As mentioned above, MRI may have a place in the purchase exam to assess a specific area known to have been previously affected with pathology. A known previously injured deep digital flexor tendon within the foot would be an example. Likewise, known locations of lameness can be specifically examined. The standing MRI devices are less of a practical issue because the focus of the exam is a very narrow field. Specificity is high if one knows where to look.

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9. Summary
Multiple imaging modalities are available to the equine practitioner for the complete evaluation of athletic horses will show areas of increased uptake of radioisotope related to the stresses of their disciplines that can differ somewhat from horse to horse. It is very common to see significantly increased radioisotope uptake in the dorsal first pastern bone of both the front and hind limbs in show jumpers. These findings do not necessarily constitute significant pathology affecting future soundness but rather represent the normal remodeling processes that occur in response to working stress. Nuclear scintigraphy will normally provide more information when looking for specific issues related to clinical findings.

8. Magnetic Resonance Imaging
Magnetic resonance imaging (MRI) has opened new doors to the understanding of equine locomotor pathology. MRI is not a substitute for more conventional imaging techniques, but it has clearly shown the shortfalls of even the best diagnostic radiographic and ultrasonographic techniques for certain bone and soft tissue lesions. Like nuclear scintigraphy, MRI can show areas of inflammation and dynamic change as well as the current state of the anatomy. The wealth of information provided by MRI presents an issue of determination as to what is currently clinically significant. Such determination must take all the observations of the examination into account, just as for other imaging modalities.

MRI is not a screening tool but more one for identification of specific pathology. If a horse is lame in the purchase examination, and said lameness is determined in subsequent examination to originate in the foot, for example, an MRI may produce an accurate diagnosis of the lesion that may elude techniques such as radiography and ultrasound and may only be regionalized by nuclear scintigraphy (Fig. 2). Such a precise technique is not appropriate for screening because the focus of the exam is a very narrow field. Specificity is high if one knows where to look.

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the horse being considered for purchase. The decision of what modalities to use and what part of the horse to image should be based on the physical examination, performance discipline, client concerns, and economic considerations. The practitioner should consider referral for more advanced imaging techniques if findings during the physical examination suggest the need.

References