



# EQUINE REPRODUCTION SVC

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## Do Radiographic Abnormalities Impact Equine Performance?

You've found the perfect buyer for your sale horse, pending the results of a prepurchase exam by his or her veterinarian. And just when you think the deal is done, the veterinarian takes a radiograph, pauses, and points out a very noticeable bone chip in your otherwise flawless horse's fetlock. After the buyers pass on your horse, your own veterinarian examines him. He tells you that while not all radiographic abnormalities cause performance problems, there's a good chance this one could.

This is a common scenario for sport horse practitioners. At the American Association of Equine Practitioners' Focus on Poor Performance meeting, held Sept. 10-12 in Lexington, Kentucky, Sarah M. Puchalski, DVM, Dipl. ACVR, reviewed with attendees the associations between performance issues identified on radiographs. Puchalski is a diagnostic imaging consultant based at Circle Oak Equine Sports Medicine, in Petaluma, California, and Palm Beach Equine Clinic, in Wellington, Florida.

It doesn't come as a surprise that, with the high-intensity work equine athletes are often asked to perform, sport horse practitioners commonly stumble across bone chips and spurs, osteochondrosis, and other bone abnormalities in these horses. However, not all affected horses present in the same manner—and some presentations are easier for veterinarians to diagnose than others.

"The easiest situation to interpret is when these findings are limited to the lame leg, in a site localized via examination or diagnostic analgesia," Puchalski said. "But most often, this is not the case.

"Often these abnormalities are seen in sound horses presenting for prepurchase or sales evaluation, or as bilateral lesions in horses with unilateral lameness," she relayed.

This means it's up to the practitioner to determine whether the abnormality is clinically significant, and he or she must rely on experience and research to make their best educated guess on the issue's impact on performance and long-term soundness.

### Performance

One of the challenges with associating radiographic defects with performance outcomes is that it's difficult to measure such successes and failures.

"The lack of objective data for comparison between horses with and without lesions makes scientific study design challenging," Puchalski explained.

Researchers have used statistics, such as total career earnings, earnings per start, and total career starts, to evaluate associations between lesions and performance in racehorses; however, there are few studies in which researchers have looked at these variables in other disciplines.

"These studies have produced good guidelines for many commonly encountered lesions," she relayed. Still, she stressed, the practitioner must use his or her best judgement when evaluating each individual horse, as no two are the same.

Another important factor to consider is that not all disciplines place the same physical demands on the horse, Puchalski said. "A 2-year-old Thoroughbred flat racing horse has different stressors placed on its cardiovascular and musculoskeletal systems than a 12-year-old Warmblood show jumper," she said. Thus, a radiographic abnormality that could prove career-altering for a horse in one discipline might have little impact on one competing in another.

Further, Puchalski said, it's crucial to consider the variability of demands within each individual sport. Upper-level dressage horses, for instance, perform more complex movements with more collection than lower-level horses, which can place additional strain on their bodies. Or, a professional three-day event rider and trainer might ask substantially more from their mounts than an adult amateur who fits training sessions in around work, family, and other commitments.

These aren't the only factors that impact equine performance, Puchalski cautioned. Other elements include the horse's natural talent and ability, training programs, rider or driver ability, the goals for the horse, and more.

"These factors most likely have unequal and variable weighting on a horse's career, cannot be measured, and confound direct evaluation of performance outcome in studies evaluating imaging versus performance," she noted.

Puchalski reviewed several abnormalities veterinarians commonly identify on radiographs and what researchers know about their impact on performance.

### Bone chips

Not all bone chips are the same, Puchalski said. However, the fragments' characteristics can have an important impact on performance. She used fetlock bone chips as an example. In the fetlock, bone chips can form in several areas, including:

- The dorsoproximal (top and front) aspect of the proximal phalanx (or P1, the long pastern; this is the most common site for bone chips in Thoroughbreds, she said);
- The dorsoproximal aspect for the sagittal ridge (a prominence of bone within the fetlock joint) of the third metacarpal or metatarsal condyle (the bottom, bulbous end of the front and hind cannon bones, respectively); and
- The palmar or plantar processes (the back side) of P1.

Generally speaking, Puchalski said, dorsoproximal P1 fractures are associated with reduced performance. However, surgically removing the chip can help mitigate those impacts, she said.

On the other hand, the effects of smooth-margined, round dorsoproximal P1 fragments are less clear, she relayed. Still, they do appear to negatively impact performance. Researchers have determined that:

- Affected Thoroughbred yearlings are less likely to start racing;
- In affected Warmbloods, increasing age and an increasing number of fragments are associated with an increased likelihood of lameness; and
- Affected older Warmbloods are more likely to have other related joint pathologies, such as joint inflammation and cartilage wear lines.

Puchalski also touched on plantar proximal (on the top back) P1 fragments. "These are probably more common in certain breeds of horses, including Standardbreds, trotters, and Warmbloods," she said, but stressed that these lesions' influence on performance—especially in Warmbloods—is not well-understood.

Regardless of the type of bone chip, Puchalski said identifying the lesion and accurately characterizing it will help a practitioner determine its impact on performance.

### Bone Spurs

Bone spurs—osteophytes (which occur in joint spaces) and enthesophytes (which occur at the tendon or ligament attachments)—can show up in a variety of locations, Puchalski said. And while spurs in certain locations, such as those surrounding the joint, are generally associated with reduced performance, others' impact are less clear.

Spurs at some sites, such as on the upper portion of the cannon bone and the upper inside portion of the tibia (the bone above the hock in the hind limb) at the medial femorotibial joint (one of the three joints that makes up the stifle), can be confusing, Puchalski said. Osteophytes at these sites don't always, but sometimes do, cause lameness. Ultimately, the veterinarian must examine each horse and bone spur individually to determine if the defect will cause issues.

Enthesophytes, on the other hand, "provide clear evidence of chronic pathologic changes at the bone/soft tissue interface," Puchalski said. Still, she noted, many commonly identified enthesophytes have limited to no impact on horses' performance.

"Because (enthesophytes) can occur at such a wide variety of locations for a wide variety of reasons, each case should be evaluated on an individual basis," she said.

When a practitioner identifies a bone spur, Puchalski said, he or she should first classify it as either an osteophyte (and determine where it is located in relation to the nearest joint) or an enthesophyte. "The categorization of the lesion will then prompt either active dismissal of the lesion as insignificant, further investigation of the lesion, or allow the observer to make a diagnosis," she said.

### Osteochondrosis

"Osteochondrosis lesions come in all shapes and sizes," Puchalski said, and researchers' and veterinarians' understanding of them is much greater in racehorses than in other breeds and disciplines.

That said, she added, "in general, osteochondrosis increases the likelihood of untoward downstream effects, including synovitis (joint inflammation) and osteoarthritis."

Some can be surgically corrected, but those that can't often have a negative impact on performance.

### Take-Home Message

Radiographic abnormalities don't always result in diminished performance; however, many do. Practitioners must use their experience and judgement, as well as a whole-horse exam, to determine each lesion's significance when it comes to performance.

"Exceptions to every rule exist, with a rare horse having an exceptional performance career with major radiographic findings, and other horses have poor performance as a result of minor findings," Puchalski relayed. "A direct correlation between radiographic lesion presence and performance will remain elusive, and good clinical judgement will always be necessary."