# A pain in the back… or is it something else?

Laura Quiney IMV imaging, discusses an evidence-based approach to investigating back pain in horses – a frequently encountered yet often difficult to diagnose condition

Pain localised to the thoracolumbar spine (back) is common in horses. Affected horses most commonly present with poor performance or behavioural issues, and back stiffness or pain. There are many potential causes of owner, or rider perceived back pain or dysfunction, meaning that investigation can be challenging.[1] Broadly, back pain can be categorised as being either primary (with pathology causing pain or dysfunction localised to the back itself) or secondary (back pain in the absence of back pathology; usually as a result of altered back biomechanics +/- muscular pain caused by pathology distant to the back, or rider or tack factors). Differentiating between the two is not always straightforward and concurrent sources of pain contributing to poor performance or the presenting complaint are commonly present, adding further complexity to the investigation.[2-5] In order to reach a diagnosis which will direct an appropriate management plan and prognosis, it is important to take a methodical approach, which combines comprehensive physical and gait evaluation, diagnostic imaging, and diagnostic analgesia.

## Investigation of back pain

Horses presenting with poor hindlimb impulsion, back stiffness, 'cold-backed' behaviour, difficulty with bending, performing lateral movements or flying changes, not working 'on the bit', stopping or refusing to go forwards, rearing, bucking or kicking are all presenting complaints which may be associated back pain.[3,5] However, none of these clinical presentations are specific to back pain. Hypersensitivity or aversion to grooming or palpation of the back, restriction of back flexibility and reduced development of the epaxial muscles (a poor top-line) with or without muscular tension or pain may occur in horses with both primary or secondary back pain or dysfunction.[4] Localised swelling or thickening with or without heat may indicate a primary back problem. In addition, markedly exaggerated reactions to palpation or moving the back may be suggestive of a primary back problem. Depending upon the horse's temperament, interpretation of the reaction to palpation and manipulation of the back can be challenging.

Gait evaluation, not limited to in-hand evaluation only, is essential. Ridden versus in-hand or lunging exercise frequently exacerbates symptoms associated with back pain. Sitting versus rising trot may exacerbate pain associated with impinging of overriding spinous processes ('kissing spines'), presumably as a result of altered back kinematics and/or force distribution.[6] Horses reportedly exhibiting dangerous behaviour may be unsuitable for ridden investigation. In these cases, evaluation of the horse being lunged, first without additional tack, followed by with the saddle, a weighted saddle or surcingle, or a dummy rider +/- side reins is advised. There is currently insufficient knowledge of back kinematics in horses without back pain versus those with back pain or dysfunction, versus horses with distant lameness contributing to an alteration of back kinematics[7]
As a result, objective gait assessment technology cannot be reliably applied to assess horses with suspected back pain or dysfunction in a clinical setting. The recently developed ridden horse ethogram – a catalogue of specific behaviours, which have been proven to potentially reflect pain in the ridden horse – is a valuable tool for owners, riders, veterinarians and all professionals in the equine industry alike to allow the identification of behavioural markers of musculoskeletal pain in ridden horses, including back pain.[8] The presence of ≥ 8/24 behavioural markers is likely to reflect pain versus a behavioural, training, or rider issue[9]

## Rider or tack-induced back pain

It is logical that ill-fitting saddles can cause back pain through uneven distribution of the rider's bodyweight and altering the kinematics (movement) of the back. Poorly fitting saddles have been shown to lead to focal areas of high pressure under the saddle.[10] It was recently shown that saddles with inappropriate tree widths can alter back kinematics and cause focal areas of high pressure.[11] The fit of the saddle to the rider is also important. A tall rider on a small saddle will not sit in the correct position but on the back of the saddle, leading to uneven distribution of weight and focal regions of high pressure, even if the saddle was correctly fitted to the horse.[12] Rider balance and skill may equally affect pressure under the saddle. Higher rider:horse bodyweight ratios lead to higher peak pressures under the saddle and can induce temporary epaxial muscle tension and pain, as well as lameness.[12-13]

## Concurrent back pain and lameness

Lameness caused by pain localised to the limbs has been shown to influence back kinematics in the absence of any primary back pain or pathology.[7,14] Abolishing the lameness with diagnostic analgesia results in normalisation of back movement, supporting that perceived back problems may be entirely secondary to a distant issue.[7] Therefore, horses with poor performance or suspected back pain/dysfunction with concurrent lameness should always be assessed ridden after lameness is abolished with diagnostic analgesia, to confirm whether

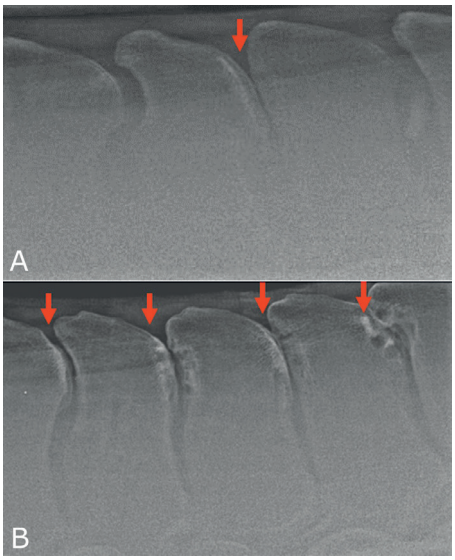


*Figure 1, A) Single site impingement between the 15th and 16th thoracic spinous processes (arrow), without associated radiological changes. The horse did not have associated back pain. B) Multiple sites of impingement between the 15th thoracic and 1st lumbar spinous processes (arrows). There are associated areas of increased radiopacity representing densification of bone, and round lucent areas consistent with cyst-like lesions or loss of bone density. This horse had clinically significant impinging spinous processes which was confirmed by observing resolution of clinical signs following infiltration of local anaesthetic solution around the affected spinous processes.*

the poor performance or back stiffness is fully explained by the lameness or not. Resolution of symptoms which were previously seen when ridden indicates that the horse has no primary back pain.

## Diagnostic analgesia

Diagnostic analgesia (blocking) is the most important test to confirm that symptoms of back pain or abnormalities seen on imaging are associated with pain localised to the back and are therefore of clinical significance. It is equally required in order to determine whether the symptoms of back pain are primary (caused by pain emanating from the back itself) or secondary (caused by an alteration in back kinematics as a result of distant lameness). Even very mild lameness in association with symptoms of back pain should always be investigated with diagnostic analgesia and not be overlooked. The relationship between gait asymmetry and spinal movement can cause a situation where the symptoms perceived to be as a result of back pain or dysfunction may appear to the rider or observer to be more evident than the causative gait asymmetry itself. Investigation of lameness with diagnostic analgesia should therefore always precede diagnostic analgesia of the back. Persistent symptoms despite resolution of lameness with diagnostic analgesia may indicate the presence of coexisting back pain. The presence of back pain can only be confirmed by observing substantial improvement of symptoms following infiltration of local anaesthetic solution around the suspected area of pathology (this will usually require previous imaging).[5]

## Imaging

Diagnostic imaging is an important stage in the investigation of back pain and the modalities which can be utilised in the investigation of back pain include radiography, ultrasonography and skeletal scintigraphy.

## Radiography

Impinging spinous processes or 'kissing spines' in the thoracic (most common) or lumbar spine is a radiological finding which is not necessarily correlated with pain. In one study, only 46% of horses with kissing spines seen on radiography had back pain.[15] Generally, greater severity of radiological changes and/or number of affected spinous processes are more likely to be of clinical significance (Figure 1).[15] Similarly, a greater dorsoventral extent of impingement between two spinous processes versus impingement at the summits only is also more likely to be associated with pain.[15] Therefore, assessment of the full length of the spinous processes, and not just of the summits, is important. Osteoarthritis of the thoracic vertebral facet joints and spondylosis may occur in isolation or coexist with kissing spines in horses

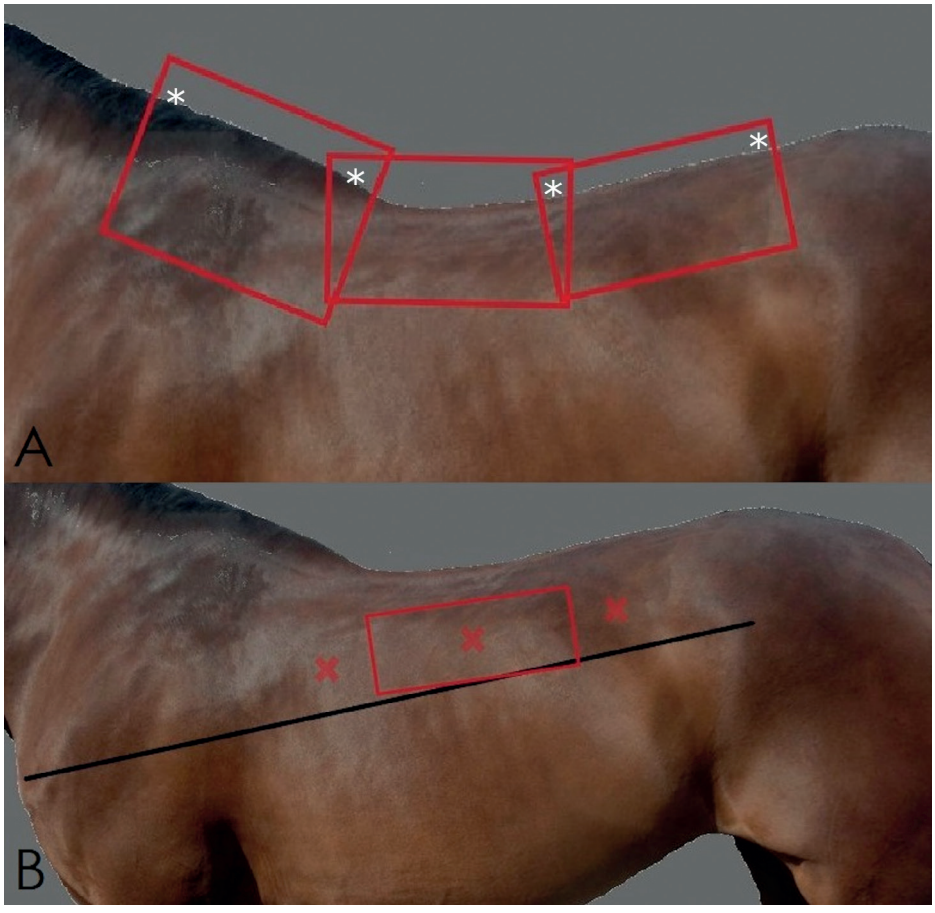


*Figure 2, A) Technique for acquisition of latero-lateral images of the spinous processes. The sequential latero-lateral images acquired of the spinous processes (red boxes represent area of collimation) should overlap and include a radiopaque marker (*) at the cranial and caudal aspects, which are essential for localisation. Tilting the generator to follow the contour of the back, as shown, allows for narrower collimation which reduces scatter. B) Technique for acquisition of latero-lateral images of the vertebral bodies. The X-ray beam should be centred (red crosses) approximately 10cm (for a 500kg horse) above an imaginary line between the point of the shoulder and the tuber coxae (black line). Tilt the generator so that the area of collimation extends in a cranioventral to caudodorsal direction, thereby being in line with the spine (red box).*

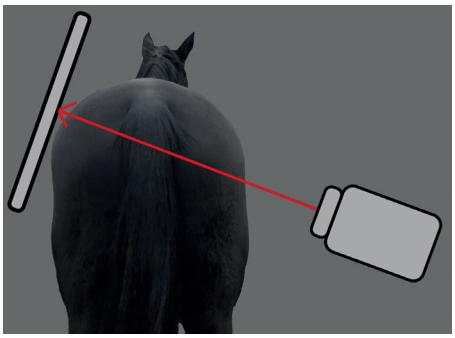

*Figure 3, Technique for acquisition of oblique images for evaluation of the facet joints. Angle the beam by 20° in a ventral to dorsal direction. The plate must be angled equally so that it is perpendicular to the beam. Centre approximately at the level of an imaginary line between the point of the shoulder and the ipsilateral tuber coxae (Figure 1). A right ventral to left dorsal image will skyline the right facet joints and a left ventral to right dorsal image will skyline the left facet joints.*

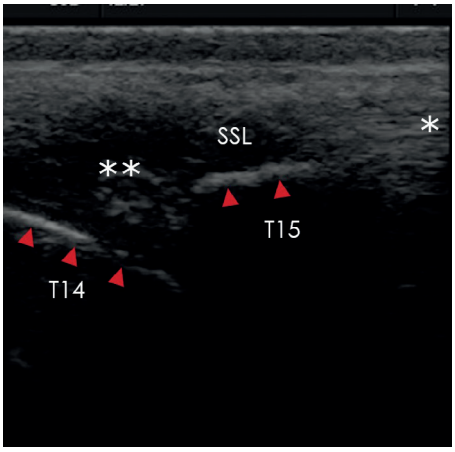


*Figure 4, Sagittal ultrasound image acquired using a standoff pad and showing the supraspinous ligament (SSL) and summits of two spinous processes (arrowheads). There is focal loss of echogenicity and echo pattern (**) at the insertion of the SSL onto the spinous process of the 15th spinous process (T15). This can be compared with the more normal echogenicity and echo pattern in the caudal aspect of the SSL (*).*

with back pain.[5] The prognosis may be more guarded in horses with clinically significant kissing spines and coexisting pathology versus with clinically significant kissing spines only. Therefore, radiographic examination should include the vertebral bodies and facet joints; not just the spinous processes. The greater thickness of overlying muscle at the level of the vertebral bodies, facet joints and the deeper (ventral) portion of the spinous processes versus the summits of the spinous processes means that a high power or high mAs technique is required, particularly in large, well-muscled or overweight horses. Handheld generators have a lower-power functioning capacity than fixed high-power generator units, and so acquiring good quality radiographs of the spine 'in the field' can be challenging, and not infrequently impossible. Newer digital radiography (DR) systems have a lower exposure requirement than older DR systems or computed radiography (CR) systems, and some have the potential to produce higher quality images with some handheld generators. However, some horses may still require imaging to be performed using a high-powered fixed unit at a clinic or hospital in order to obtain a complete diagnosis and accurate prognosis. Overlapping latero-lateral images of the spinous processes and vertebral bodies, using radiopaque markers applied to the coat over the summits of the spinous processes to aid localisation are acquired (Figure 2). Left and right oblique projections acquired at 20° from ventral to dorsal are required to assess the left and right facet joints, respectively (Figure 3).

## Ultrasound

Soft tissues of the back including the supraspinous and infraspinous ligaments, epaxial muscles and the dorsal contours of the spinous processes and facet joints can be evaluated ultrasonographically. A standoff pad and a linear transducer are usually required for evaluation of the very superficial supraspinous ligament (Figure 4). A convex transducer will produce better images of the deeper structures, including the facet joints and multifidus muscle (the main stabilising muscle of the spine; Figure 5), although a linear transducer may provide enough depth of ultrasound penetration in small to medium sized horses.

## Skeletal scintigraphy

Scintigraphy ('bone scan') has commonly been used in horses with suspected back pain. However, increased radiopharmaceutical uptake ('hot spots') indicating increased osteoblastic activity does not necessarily equate with pain. Increased radiopharmaceutical uptake may be seen in the summits of spinous processes of horses without back pain.[15-18] One study showed that the intensity of increased radiopharmaceutical uptake and the number of affected spinous processes was associated with back pain.[15] If back pain and lameness coexist, or in horses with nonspecific poor performance in which back pain is suspected, skeletal scintigraphy used indiscriminately as a 'screening' evaluation is unlikely to lead to a full and accurate diagnosis of the causes of poor performance.[19] When employed in the investigation of a horse with poor performance, careful interpretation in light of the clinical findings and results of other diagnostic tests, where available (such as blocking or results of other imaging) is vital.

## Conclusions

Back pain can be primary or more frequently, secondary as a result of distant lameness causing an alteration in back biomechanics, a poorly fitted saddle to either or both the horse and rider, and rider factors such as rider bodyweight to horse weight ratio, balance and skill. Key to elucidating the underlying cause(s) is a complete gait evaluation including ridden exercise when possible, appropriate diagnostic imaging (typically radiography and ultrasonography), and confirmation that pain is associated with the areas of pathology identified on imaging using diagnostic analgesia. Although back pain or dysfunction is very common in the UK horse population, reaching an accurate, definitive diagnosis cannot be achieved without a comprehensive diagnostic approach. Appropriate management and accurate prognoses cannot be prescribed in the absence of a definitive diagnosis, and therefore this must always be sought. EH

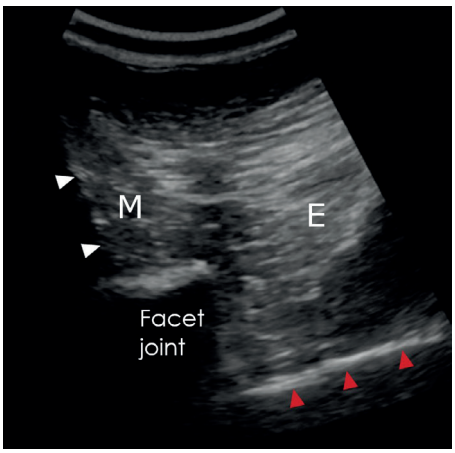


*Figure 5, Transverse image acquired using a convex transducer and showing the right epaxial region at the left of the facet joint between the 18th thoracic and 1st lumbar vertebrae. There are no abnormalities. M, multifidus muscle; E, epaxial muscle; red arrowheads, transverse process of the 1st lumbar vertebra; white arrowheads, spinous process.*

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