Lameness Associated with the Pelvic Region in Sports Horses

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Pelvic injury in the mature athlete is a comparatively unusual cause of lameness, except as the result of trauma, due to a fall, rearing and falling over backwards, becoming cast in the stable, or sustaining an injury during transport. When there is no history of trauma, diagnosis can be difficult and it is frequently necessary to exclude all possible sources of pain in the distal aspect of the limb before focusing on the pelvic region.

Clinical assessment of individual structures of the pelvic region by visual examination and palpation is not easy, especially in warmblood and draft breeds, because of the large muscle mass of the hindquarters. It is frequently only possible to palpate the tubera coxae (TC) and tubera sacrale (TS). Large muscle mass may prohibit palpation of the greater trochanter of the femur. Atrophy of the hindquarter musculature is non-specific and can reflect disuse due to pain arising anywhere in the limb, although atrophy of the muscles around the tail head often reflects injury to the tuber ischium (TI), or local nerve damage. Asymmetry of the height of the TS is a common finding in horses in full work, free from lameness, although may be seen in association with poor performance or alterations in hindlimb gait. Alteration in muscle mass in the proximity of the TS can superficially give a false impression of asymmetry of the TS themselves. Asymmetry of the TC may reflect a previous injury unassociated with ongoing pain. Poor muscle development in the lumbar region and over the hindquarters may make the TS and the summits of the dorsal spinous processes of the lumbar vertebrae appear abnormally prominent. This should alert the clinician to the possibility of thoracolumbar or pelvic pain; however, this finding is non-specific and may reflect the horse’s work history.

The pelvic region should be appraised visually and palpated systematically, and although preliminary assessment is usually best performed in the stable, for accurate evaluation of symmetry of the musculature and bony elements of the pelvic region the horse should be standing completely squarely behind, on a firm level surface with the horse looking straight ahead. In a horse with severe lameness this may not be possible, since the horse may be unwilling to load the lame limb fully. Careful differentiation should be made between muscular and bony asymmetry. Marked muscular atrophy can make accurate assessment of symmetry of the pelvic bones difficult. Elevation of the tail may be necessary to identify muscle atrophy around the tail head, which may be seen in association with either nerve damage, or injuries of the ipsilateral TI.

The muscles of the lumbar and pelvic regions should be assessed carefully to identify any area of abnormal muscle tension, pain on palpation or unusual firmness. Firm stroking of the muscles firstly with a finger and then with a blunt ended object e.g. artery forceps, is useful to determine whether either muscle spasm, or muscle fasciculation are induced.
Palpation of the caudal muscles of the crus is also important since abnormal pain or tension can reflect either primary muscle injury, or an injury of the ipsilateral TI.

Firm pressure should be applied to the bony prominences to see if pain can be induced, or an abnormal reaction such as marked sinking on the hindlimbs when pressure is applied to the TS. Both TC should be grasped simultaneously and the horse rocked from side to side to determine whether crepitus can be detected by palpation or auscultation, bearing in mind that the absence of crepitus does not preclude the presence of a fracture.

Careful, systematic examination of the pelvic canal region per rectum is also indicated, in order to assess the aorta and iliac arteries, the psoas musculature and the caudal aspect of the ilial shaft, the pubis and ischium.

Manipulation of the limb may be resented if there is pain associated with the coxofemoral joint, but generally the responses to flexion of the limb, protraction, retraction or abduction are rather non-specific. A horse with pain associated with a coxofemoral joint may be reluctant to stand on one limb, with the other limb raised and may behave very awkwardly in anticipation of discomfort. However, this is a non-specific reaction and some horses present difficulties in picking up the hindlimbs in the absence of any sign of lameness or poor performance. Difficulties in picking up hindlimbs may be due to reluctance to accentuate weight bearing on the lamest limb, reluctance to flex the lame limb, or be psychological. If the horse is a shiverer, unilaterally or bilaterally, the response to hindlimb flexion can be difficult to assess.

**Fracture of the tuberischium**

Fracture of the TI sometimes occurs in event horses which fall when jumping up onto a bank. They may also occur in any horses as a result of a fall on the flat. However, they have also been recognised in horses from other disciplines, with no known history of trauma. There is usually acute onset relatively severe lameness. Mild localised swelling is easily overlooked, unless the TI is suspected as a site of injury. The ipsilateral semimembranosus and semitendinosus muscles are usually sore to palpation. Atrophy of the muscles around the tail head often develops within 7 to 10 days. Usually there is no palpable crepitus. In more chronic cases pain on palpation may not be evident, although the tubera ischii may appear asymmetrical, and the lameness may be only mild or moderate.

Diagnosis of a fracture of the TI can be confirmed using nuclear scintigraphy. Dorsal oblique and caudal views are useful. There is usually both an increased radiopharmaceutical uptake (IRU) and an abnormal pattern of RU (Fig. 1). In some horses it may be possible to determine whether the fracture is complete and if it has become significantly displaced. Increased RU may also be associated with enthesopathy and injury of the semitendinosus muscles which should also be evaluated carefully both scintigraphically and ultrasonographically. Discontinuity of the bone outline may also be confirmed using diagnostic ultrasonography. Radiographic examination can also be performed. Treatment by restriction to box rest usually results in a satisfactory outcome,
although very occasionally sequestration of the fracture fragment occurs, necessitating surgical removal.

Occasionally, a horse presents without obvious lameness, but with reduced performance and a tendency to jump drifting consistently to one side, due to pushing off unevenly with each hindlimb. This has been in association with reduced muscle development over one of the tubera, and IRU in the TI. The outline of the TI appears irregular ultrasonographically.

Increased RU of a normal pattern in one TI is occasionally seen as an incidental finding and therefore its clinical significance must be interpreted with care. Increased RU may also be associated with primary muscle injury of semimembranosus or semitendinosus (Fig. 2).
Fig. 2b. Caudal scintigraphic image of the hindquarters of the same horse as Fig. 2a. There is focal intense increased radiopharmaceutical uptake (IRU) in the right tuber ischium and also mild focal IRU in the muscle distal to the tuber ischium.

Fig. 2c. Ultrasonographic images of the left (LH) and right (RH) semitendinosus muscles of the same horse as in Figs. 2a and b. There is increased echogenicity of the right semitendinosus muscles, consistent with myopathy. The horse was treated with therapeutic ultrasound and has made a complete recovery.
Fracture of the greater trochanter of the femur

Fracture of the greater trochanter of the femur is an unusual injury, causing severe lameness. There is a tendency for the fracture fragment to be displaced cranially, due to the pull of the attachments of the deep and middle gluteal muscles. There are usually no localising clinical signs, unless the horse is very poorly muscled and the greater trochanter is readily palpable. The diagnosis is based on nuclear scintigraphic examination, with or without diagnostic ultrasonography. The prognosis for return to athletic function with conservative treatment is guarded.

Fracture of the sacrum

Fractures of the sacrum may be complete or incomplete and result in bilateral hindlimb lameness. If the fracture is complete the contour of the hindquarters when viewed from the side changes, so that there is abnormal angulation of the rump. There may be associated neurological signs including flaccid paralysis of the tail, reduced sensation around the tail head, urine dribbling in a mare and loss of anal tone. The onset of neurological signs may be delayed for several weeks after the primary fracture. The fracture may be palpable per rectum. The fracture may be confirmed both radiographically and using diagnostic ultrasonography per rectum. The prognosis for return to athletic function is very guarded.

Muscle injury

Muscle soreness is frequently unassociated with any recognisable histopathological changes within the muscle and is often secondary to some other cause of lameness, due to the altered way in which the horse is moving. Muscle soreness can often be induced by over-use of an under trained muscle, and can result in localised soreness and stiffness for several days. Focal intense muscle spasm and pain can cause sudden onset reduction in performance and if primary is usually relieved by manipulation to relieve the muscle spasm, producing rapid amelioration of clinical signs.

Focal muscle soreness associated with localised swelling may be due to intra-muscular haemorrhage, muscle fibre tearing or equine rhabdomyolysis. Diagnosis of the cause may be determined by measurement of serum muscle enzyme concentrations and by ultrasonographic evaluation. Haemorrhage results in an area of diffuse increase in echogenicity within the muscle. This should be differentiated from hyperechogenic regions that are the result of chronic muscle fibrosis. Serum muscle enzyme concentrations are usually not elevated in those cases of haemorrhage, muscle fibre tearing or fibrosis.

Damage to deep muscles of the hindquarters is difficult to identify since there are frequently no localising clinical signs to alert the clinician to the possible site of damage. Thermographic evaluation can be useful to help identify superficial muscle injury.
Some horses with reduced performance have pain on palpation of the psoas muscles per rectum. This may be primary or secondary to lumbosacral, or sacroiliac pathology and is an indication for nuclear scintigraphic evaluation of the pelvic region and ultrasonographic examination of the lumbosacral vertebrae.

**Desmitis of the dorsal sacroiliac ligament**

Desmitis of the dorsal sacroiliac ligament has been recognised in horses that have presented with poor performance or lameness, with or without focal pain on palpation. Usually lesions have been restricted to 1 side and have been characterised ultrasonographically by enlargement of the ligament and disruption of normal architecture, with hypoechoic regions seen in transverse images and loss of parallel alignment of echoes in longitudinal images. There may be entheseophyte formation on the tuber sacrale.

**Aorto-iliaco-femoral thrombosis**

Aorto-iliaco-femoral thrombosis is a relatively uncommon cause of exercise induced hindlimb lameness of variable severity. Clinical signs may be sudden and severe in onset, or subtle initially and slowly progressive. Horses of all ages may be affected. The incidence is higher in male horses than mares. The pathogenesis is unknown. Clinical signs vary depending on the site(s) of thrombus formation, its size and the degree of vessel occlusion. Lesions occur most commonly at the terminal aorta, but may also involve both the internal and external iliac arteries and the femoral arteries, either unilaterally or bilaterally. Lesions restricted to the femoral artery have not been documented. In mild cases the horse may present with poor performance, early fatigue or slight loss of hindlimb action during a work period. If the lesion(s) is predominantly unilateral the horse may show episodic hindlimb lameness, induced by work. In more advanced cases there may be progressive shortening of hindlimb stride with exercise, followed by the development of distress and sweating, except over the hindlimbs. If the horse is allowed to stop it may repeatedly flex its hindlimbs and stamp the feet to the ground. The affected limbs feel cool and delayed filling of the saphenous veins may be seen, with reduced pulse amplitudes in the dorsal metatarsal artery. Clinical signs usually resolve if the horse is allowed to stand still for a few minutes.

In horses with advanced thromboembolism, it is usually possible to palpate a thrombus per rectum in the terminal aorta, which feels abnormally firm. Pulses in the iliac arteries may be reduced or absent. In less advanced cases diagnostic ultrasonography is required to identify the lesion (Fig. 3). Ultrasonography is also useful to determine the extent of the lesions. Examination of part of the femoral artery can be performed transcutaneously on the medial aspect of the crus and the use of Doppler ultrasonography to measure blood flow characteristics should help to determine if there is more proximal site of obstruction.

Vascular phase or first pass radionuclide angiography can be used to determine blood flow in the aorta and iliac arteries, and also the femoral arteries. However, the sensitivity of the technique for detection of subtle lesions has yet to be determined.
Osteoarthritis of the coxofemoral joint

Osteoarthritis (OA) of the coxofemoral joint is an unusual cause of hindlimb lameness in the horse, usually occurring unilaterally. It may occur secondary to dysplasia, rupture of the teres ligament, or trauma. Lameness varies from moderate to severe. The horse often resents flexion of the limb and is unwilling to stand on the limb for long periods with the contralateral limb picked up. The degree of gluteal muscle disuse atrophy may be more than that associated with pain in the more distal part of the limb. Intra-articular analgesia may or may not result in improvement in lameness.

Nuclear scintigraphic evaluation may be helpful in highlighting the coxofemoral joint as abnormal, especially if the results of intra-articular analgesia are equivocal. However, it is important to be aware that loss of muscle over the hindquarter of the lame limb or superimposed radioactive urine in the bladder may confound image interpretation.

Definitive diagnosis of OA requires radiographic examination and high quality radiographs can only be achieved with the horse in dorsal recumbency, under general anaesthesia (Fig. 4). Abnormalities include periarticular osteophyte formation, new bone formation along the femoral neck, lucent zones in the subchondral one of either the acetabulum or the femoral head, and loss of congruity between the acetabulum and the femoral head. Care should be taken not to confuse the depression in the femoral head and
underlying radiolucent zone at the site of insertion of the teres ligament as a lesion. With advanced OA irregularities of the acetabulum may be detectable ultrasonographically.

Intra-articular medication of a CF joint with radiographic abnormalities has yielded disappointing results. The prognosis for return to athletic function is guarded.

Fracture (or enthesopathy) of the third trochanter of the femur

Fracture of the third trochanter of the femur is a relatively unusual injury, resulting in acute onset, severe lameness, that often improves quite rapidly with box rest. In a lean poorly muscled horse it may be possible to elicit pain by palpation, but in a well-muscled warmblood type this is usually not possible, even in acute cases. There are no particular gait characteristics. Nuclear scintigraphy is particularly valuable for tentative diagnosis of a fracture. There is IRU and sometimes a change in the pattern of RU (Fig. 5). Diagnosis may be confirmed radiographically, but good quality radiographs can only be achieved under general anaesthesia. Fractures are often longitudinal, occurring at the base of the trochanter. There is usually minimal displacement. Diagnostic ultrasonography may be helpful and is useful to exclude abnormalities of the superficial gluteal muscle, which inserts on the third trochanter. Insertional tears of this muscle may be associated with a similar scintigraphic appearance. Treatment is box rest for 2 months followed by walking exercise for a further month. Healing may occur by either osseous or fibrous union. Prognosis is good.
Fig. 5. Lateral scintigraphic image of the right coxofemoral joint of a 6-year-old Warmblood dressage horse with an acute onset of severe left hindlimb lameness. There were no localising clinical signs and no response to local analgesic techniques up to and including the stifle. There is focal moderate increased radiopharmaceutical uptake in the third trochanter of the femur.

Further reading


