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Back pain: A Significant Cause of Poor Performance in Show Jumping Horses (Diagnostic challenge and Treatment)

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Introduction

Back pain are common issues in equine practice and are often considered to be a cause of poor performance, stiffness in the back and/or abnormality of the hindlimb gait in sport horses.[1] History and clinical signs are often nonspecific and a definite diagnosis is a challenge. Back pain has been more and more recognized as a contributing or even causing factor in equine lameness in recent years. The prevalence of back problems in horses varies greatly (from 0.9% to 94%), depending on the specialization or type of practice surveyed. Diagnosis of back pain requires a thorough clinical examination combined with imaging techniques. Veterinarians often have difficulties when dealing with a horse that has no obvious localized pain or a vague, unspecified lameness. Neck or back problems and limb lameness are often interrelated.[2] Distal limb injuries can cause an alteration in carriage of the affected limb and altered gait, which can subsequently overwork or injure proximal limb musculature and the paraspinal musculature.[2,3] Similarly, vertebral column or sacroiliac joint injuries can produce gait abnormalities, increased concussive forces, and distal limb lameness.[4] At the horse back, sacroiliac joint osteoarthritis has been recognized as a significant cause of back pain and poor performance in horses. About 15% of competition horses, especially jumper and eventing horses are reported to be clinically affected by osteoarthritis of the sacroiliac joint. Clinical signs of sacroiliac osteoarthritis are often non-specific and may include poor performance, refusal of jumps, lack of limb impulsion, poor croup muscling, back soreness, resistance to trot or a low grade or shifting hind limb lameness.[2-5,6]

A horse which is presented for investigation with history of a rider' s complaint of one or more of the followings: cold-back behavior, difficulty in performing lateral movement, unwillingness

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to perform flying changes, stiffness, naughtiness, reluctance to work on the bit, lack of hindlimb impulsion or loss of action, uncharacteristic refusing, stopping or resisting, head tossing, or leaning on the rider's hand, bolting, bucking or rearing should be suspected of having back – related pain either alone or in conjunction with other problems. The diagnostic dilemma facing veterinarians is to decide whether the limb or the vertebral column is the primary or initial cause of the horse's clinical problem.

Anatomy of the Neck and Back

The spinal column of the horse starts at the occipit of the skull and ends approximately 50 elements later at the end of the tail. Like all mammals, the horse has 7 cervical vertebrae (C1 – C7). The atlas (C1) connects the vertebral column to the head and articulates with the epistropheus (C2). These two cervical vertebrae are entirely different in shape compared to the following 5 vertebrae, providing the opportunity for the specific flexion-extension and rotational motions of the head. The 18 (Range 17-19) thoracic vertebrae have a much shorter body than the cervical vertebrae. Whereas the latter have no spinous processes, the spinous processes of the thoracic vertebrae increased rapidly in size with Th2 – Th9 forming the basis of the withers. Normally, the tip of Th5 or Th6 forms the highest point of the withers. The average number of lumbar vertebrae is 6 (rang 5-7). Their vertebral bodies are longer than those of thoracic vertebrae, and their spinous processes are shorter. The large transverse processes are characteristic. These are positioned very close to each other and the processes of L5 and L6 normally articulate, as do the processes of L6 with the ileal wings. The sacrum is made up of 5 sacral vertebrae that ankylose during the first 4^{th} or 5^{th} year of life, resulting in a completely rigid structure. The sacrum is connected to the ileal wings by the sacroiliac joint.[4]
There are a large variety of ligamentous structures in the equine back. These ligamentous structures that form part of the back can be divided into short and long ligaments. The interarcual ligaments between the vertebral bodies belong to the short ligaments and the longitudinal dorsal ligament is one of the long ligaments.[4-7]
The great majority of the muscles that attach to bony elements of neck or back run from one part of the axial skeleton to the other, not to parts of the appendicular skeleton. There are two muscular layers; deep and superficial. The multifidus and spinalis dorsi form part of the deep layer. The superficial layer is the largest part in volume formed by the longissimus dorsi, one of the largest muscles of the body.[4]

Causes of back pain

-*Improperly fitting tack:* A saddle that is too narrow will feel uncomfortable to the horse, pinching its withers and back. A saddle that is too wide places the weight of the rider directly on the backbone rather than properly distributing the weight. Saddle pads can help provide protection for this problem, but should not be considered as an alternative to properly fitting tack.[2,8]
-*A rider who sits unevenly in the saddle:* This may cause the least serious type of back pain, resulting in bruising of the muscle and skin. It concentrates excess weight on one part of the horse's back, squeezing capillaries, decreasing circulation to the area, and causing muscles to be painfully inflamed. If the problem is chronic, the muscle and skin could injure permanently. A

patch of white hair or a bald spot due to damaged hair follicles is the most common evidence of this type of back pain.[2,8]

-*Fatigue, poor condition, an accident (such as slipping), or poorly executed jumping can cause excessive strain to the longissimus dorsi:* These muscles which normally extend and flex the spine.

-*Straining of the horse's supraspinous ligaments*: These ligaments running along the middle of the horse back can be strained during galloping and jumping but will take longer to heal than a muscle injury. Once strained, this may cause the horse to be prone to this type of injury.[2-8]

-*Kissing spines:* (or impingement of the dorsal spinous processes) it occur due to repetitive undulations in jumping horses, Basculing, or rounding over a vertical fence, overextending upon landing or stretching out and hollowing the back over a wide oxer could cause this problem. Consequently, the individual spinous projections are pushed together tightly. This generally occurs from the end of the withers to the beginning of the loin (10^{th} – 18^{th} thoracic vertebrae).[2-8]

-*Back pain may develop secondary to chronic leg lameness:* Hind and forelimbs may both be affected by problems such as bone spavin, resulting in complex multiple limb lameness. Abnormal posture and use of the thoracolumbar soft tissues when the horse attempts to compensate for the lameness, may cause secondary back pain.[8]

Clinical Examination for Back Pain Diagnosis

The principle goal of the clinical and physical examination of the vertebral column and pelvis is to identify if a back or pelvic problem exists and to localize the injury to either soft tissue, osseous, or neurologic structures. The process starts with the history. Taking time for a good interview with the client is the first priority. Guiding questions can assist in gaining information about the gait in which the complaints are more evident, e.g. if there are time-related changes in the quality of gaits, difficulties in keeping the right lead, etc. Vertebral dysfunction is most often characterized by localized pain, muscle hypertonicity, reduced joint motion, and subsequent functional disability.[2] The challenge, as with any musculoskeletal injury, is to identify the specific musculoskeletal structures affected and quantify the associated disability or altered function. The most common categorization of musculoskeletal injury consists of mild, moderate, or sever degrees. Further quantification may involve the use of a 0 – 10 scale in an attempt to objectively monitor changes in pain, muscle hypertonicity, reduced joint motion, or functional disability.[2,9] Clinical examination of the horse, performed as with any lameness case, will be the next important element of evaluation. More emphasis on observation of lateral bending in walking serpentines and circles in walk, trot and canter, quality of the walk (4-beat) and canter (3-beat) can give essential information to localize a spinal lesion. To assess the mobility of the spine and the range of motion within every part of the spine, passive mobility tests are performed. These tests allow evaluation of the range of motion of each specific part of the spine. As far as muscle lesions are manifestations of pain, symmetry of the range of motion is a very important criterion. Specific tests to localize pain in specific spots include: manual pressure on the individual dorsal processes of the thoracal, lumbar vertebrae and the tubera sacral and tests for sacroiliac pain with lateral manipulation of the pelvis. In most cases of suspected back pain, with a thorough clinical examination, localizing the specific part or parts of the spine that are the cause will be possible. More specific techniques can then be used to focus on the parts of the spine that were identified during physical examination.[2,10] Radiology can be used for further examination of

the cervical and thoracal spine (withers area and vertebral bodies in the more cranial part, where the lungs facilitate radiological imaging). Dorsal images of the vertebral bodies, and more in particular, horizontal processes, dorsal processes, spinal ligament, epaxial muscles and facet joints of the thoracic and lumbar spine as well as the sacroiliac region can be made with ultrasound. Scintigraphy is a great technique for further examination of back-related issues, especially when localization of specific spots of interest facilitates a more focused approach.[2,11] Electromyography can be used to examine muscles condition as well as assessing neurogical involvement. Current diagnostic imaging modalities, such as ultrasonography, radiography, and nuclear scintigraphy, are not highly specific or sensitive for diagnosing sacroiliac joint osteoarthritis or other problems in this anatomic area. The diagnosis of sacroiliac osteoarthritis is typically based on exclusion of other possible causes of poor performance and hind limb lameness. The primary diagnostic tools used by practitioner for lower limb lameness evaluation are perineural and intra-articular joint injection with local anesthetics.[2,12] Unfortunately, the deep and seemingly inaccessible location of the sacroiliac joint in horses limits the clinical application of intra-articular or periarticular injections to this location. Several authors suggest injection of medications adjacent to the sacroiliac region, however, inappropriate needle placement or the use of needles that are too short may limit the effectiveness of the injected medication. However, a thorough clinical examination combined with a good history can be done without all the more expensive equipments in field.[2]

Clinical Signs

The athletic demands placed upon the elite show jumper are huge. It must be able to jump large fences with precision, accuracy, care and sometimes fast. It must be supple and able to make sharp turns and jump from a virtual standstill, while also being able to jump almost from a gallop. It requires tremendous strength in the back and hindlimbs to be able to adjust stride length and jump from “deep” and bascule, with the capacity to jump large spread fences.[2-8]
Some common behaviors that indicate back pain are listed as follows:
- Bucking during upward transitions, especially to the canter/lope from the trot. The push and lift required for a smooth transition may be too hard for a strained back, especially if the rider is a bit heavier.[8]
- Refusing to stand during mounting. When a once mannerly horse abruptly begins walking off or sidestepping when mounted, this may be a sign of back pain. The horse will most likely resent tightening of the girth as well. A mounting block may help, but won't cure the back pain.[8]
- Sinking during mounting, placing saddle or tightening the girth.[8]
- Jumping mistakes or refusals. Jumping, particularly over fences 3 feet or higher, necessitates rounding of the back and thrusting from the hindquarters which can increase back pain.[8]
-Difficulty in negotiating hills. A horse must engage its hind end and use its back muscles to climb or descend hills, so a horse with a sore back might not want to climb or descend hills, will slow down considerably or take hill sideways to decrease stress.[8]
- Reluctant sliding stops. The extreme rounding of the back required for sliding stops might be intolerable for a horse with back pain.[8]
- A poor general gait, stiffness and abnormal movement of the pelvis and back. The horse may have a shorter stride and lower foot flight arc in the hind legs, decreased flexion at the hock and

stifle, a bunny hopping gait or a very stiff, flat-backed gait where the whole back and pelvic are very flat and rigid due to overflexion or extension of the sacroiliac or lumbosacral area.[8]
- Reluctance to trot or canter.
- Reluctance to pick up and maintain one lead of the canter.
- Changing jumping style.
- Vigorous tail movements.
- Grinding teeth.
- Dragging one or more hind feet.
- Reluctance to back.

Treatment

The proposed treatment of back and sacroiliac joint injuries is only as good as the diagnosis. Since definitive diagnosis of back and sacroiliac joint pathology remains difficult at times, treatment recommendations are usually supportive and non-specific.[13] A clinical trial of phenylbutazone (2 g, p.o., BID for 4-5 days) is often used to assess the inflammatory component of any musculoskeletal problem. The use of nonsteridal anti-inflammatory drugs (NSAIDs) will often produce an improvement in osseous or articular pathologies although this may be incomplete and short-lived. Other NSAIDs include ketoprofen (2.2 mg/kg) for up to 5 days or naproxen (5-10 mg/kg p.o., BID for up to 14 days). Long-term use of phenylbutazone at low dose (1 g, p.o., SID) for mild pain and stiffness can be beneficial, but may mask the signs of other musculoskeletal injuries or compensation (2-13). The additional use of glucosamine, chondroitin sulfate, or methylsulfonylmethane (MSM) has been reported to help reduce inflammation and improve the clinical signs of osteoarthritis in some horses. Muscle relaxants have been advocated for back and gluteal muscle hypertonicity, but their effectiveness seems to be inconsistent and varies between individuals. A clinical trial of methocarbamol (15-44 mg/kg, p.o., SID) or dantrolene sodium (2 mg/kg, p.o., SID) will help some horses with back or gluteal muscle-related soreness or hypertonicity. These drugs may not have any specific effects other than reducing muscle tension or spasm in order to allow the normal healing process to occur. The basic principles of conservative management of spinal and sacroiliac osteoarthritis are to reduce pain and inflammation in order to improve healing, followed by a program of rehabilitation and exercises to prevent further injury or stress to the dorsal articular facets or sacroiliac joints. Therefore, it is necessary in many cases to use a combination of medication (NSAIDs, corticosteroids, or muscle relaxants) and physical or manipulative therapies.[2] The deep overlying croup musculature and seemingly inaccessible anatomic location of the spinal articulation and sacroiliac joint has limited the clinical application of intra-articular injection in horses.[2] Regional perfusion of the dorsal spinous processes, articular facets or sacroiliac joint region with local anesthetics or anti-inflammatory drugs for diagnostic or therapeutic purposes is a viable alternative, but inappropriate needle placement or the use of too short needles are why most techniques have yielded suboptimal diagnostic or therapeutic effects.[2,13] A medial approach to the sacroiliac joint provides the most direct, safe and consistent periarticular injection technique.[2] Periarticular injection is performed as close as possible to the caudomedial sacroiliac joint margin due to the high prevalence of degenerative changes affecting the location. The injection mixture typically includes combinations of methylprednisolone acetate, isoflupredone acetate, and hyaluronic acid. Improvement usually takes 2 to 6 days and repeated treatment is sometimes

necessary at six to nine month intervals, similar to intra-articular injection at other sites.[2,13] Injection of corticosteroids in the sacroiliac joint region have been quite extensively, however, there are not any well designed or controlled trials currently reported in the literature.[2,13] Soft tissue and articular motion restrictions can be directly addressed with specific stretching exercises to induce creep and relaxation within fibrotic or shortened periarticular soft tissues.[9] With minimal training, horses and their owners can be taught how to do simple but effective passive joint mobilization and active stretching exercises (Carrot stretching) to improve both axial skeleton and limb flexibility. These concurrent therapies also help to encourage the owner to participate in the healing process and provide close monitoring of the patient's progress. Treatment of chronic sacroiliac joint injury typically focuses on a gradual return to a low level of exercise to maintain muscle development of the back and gluteal regions.[2,14] Maintenance of these regions counteract the clinical signs of poor performance and reduced hindlimb impulsion. In acute sacroiliac joint injuries, cantering or galloping is contraindicated, because it places stress on the sacroiliac joint and may exacerbate preexisting pathology. The high musculoskeletal demands required during these activities may also cause horses to decompensate and injure muscles or other soft tissue. Modification in exercise or training program duration, frequency, or intensity need to be tailored to individual horses and their ability to compensate and increase the work load. Acupuncture and chiropractics are non traditional approaches that have been used by some practitioners to assist in the symptomatic treatment of horses with presumed sacroiliac joint problems.[2,3] The principal indication for equine chiropractic evaluation and treatment are localized musculoskeletal pain, muscle hypertonicity, and restricted joint motion. This triad of clinical signs can be found in a variety of lower limb disorder, but it is most evident in upper limb, neck, or back problems. Physical therapy modalities that may have direct application to sacroiliac joint problems in horses include devices that apply electrical currents for pain control or neuromuscular rehabilitation, thermal modalities (superficial and deep heat or cold applications) for influencing inflammatory mediators and collagen extensibility and altering nerve conduction, and mechanical approaches (massage, vibration, stretching, and training exercises) for maximizing musculoskeletal rehabilitation. Many forms of physiotherapy may give temporary improvement, but a lasting success is unlikely without establishing a definitive diagnosis of the sacroiliac joint problem.[2,13-15]

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