Ask the expert

Common orthopaedic injuries in endurance horses

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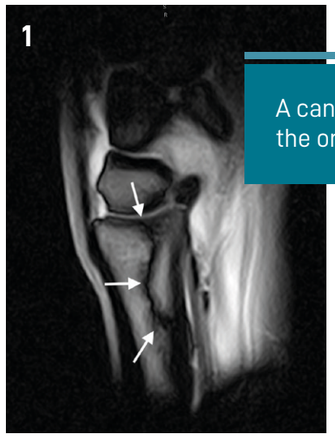
Orthopaedic problems and lameness are a major cause of elimination from endurance competitions particularly at the longer distance events and in older horses. They also cause lost time out of training and are the reason for eventual retirement of many horses. As with many injuries, prevention is often better than a cure and an awareness of the common types of injury that occur, along with some of the reasons that they may develop, can help minimize the risks. There are a number of commonly reported orthopaedic injuries in endurance horses including suspensory ligament/proximal metacarpal pain, foot pain, hind end muscle pain and stress-related bone injury. However two of the most potentially career-limiting problems are osteoarthritis and stress fractures.

Stress fractures are a form of repetitive bone injury more typically seen in Thoroughbred racehorses in training. However in recent years stress fractures have been more commonly recognised in Endurance horses, possibly related to the increasing speeds during endurance competitions, particularly over the longer distances.

The classic presentation for stress fractures is a sudden onset of marked lameness during or immediately after a period of fast work or a race. This can often improve rapidly with limited physical signs to localize the cause of lameness. If undetected, the horse is at risk of catastrophic injury if these fractures progress to becoming complete. This is due to a predisposition for stress fractures to develop in certain common locations including humerus, tibia and pelvis. Complete fractures of these long bones are not yet amenable to fracture repair in adult horses.



A cannon bone stress fracture/injury at the origin of the suspensory ligament.

White arrows on MRI (1 and 2) to highlight the area of bone injury.

2 x-rays (3 and 4) of the upper cannon bone taken the same day as the MRI.

But how do stress fractures form? The bone of a horse's skeleton is constantly being repaired, turned-over and replaced during the course of life and normal exercise. In response to normal training, all bone undergoes a degree of stress and micro-injury, which is then repaired, allowing the overall structure of the bone to adapt to training. However if the degree of damage is too great (e.g. undertaking lots of long pieces of fast work) or if the speed at which the repair tissue develops and strengthens can't keep up with the degree of damage (e.g. sudden increases in training level and intensity following a period of time off) a fracture will develop. In many stress fractures, signs of the body's attempts to heal i.e. bony callous or new bone around the fracture site are already evident when the horse initially becomes lame, highlighting the longer term bone injury that may have been present. Therefore x-rays or ultrasound can be important first steps in screening for this type of injury in horses that pull up extremely lame after exercise. Other more advanced imaging techniques e.g. nuclear scintigraphy (also known as a "bone scan") can be essential in screening for and pinpointing stress fractures or providing more detail about the extent of bone damage in cases where x-rays haven't fully demonstrated the extent of the lesion e.g. MRI of the upper cannon bone at the suspensory origin.

Probably the most common cause of musculoskeletal pain and lameness across all types of competition horses is osteoarthritis. Unlike in humans where arthritis can develop for a variety of reasons including inflammatory and autoimmune arthritis, the vast majority of arthritis in horses is "traumatic" or "post-traumatic". This means that arthritis develops secondary to one of a number of different injuries to the joint. This includes injuries to the joint capsule, synovial membrane, stabilizing ligaments of the joint, meniscus (in the stifle), supporting bone (including the subchondral bone plate) or cartilage damage or degeneration.

Other terms like degenerative joint disease (DJD), OA (abbreviation for osteoarthritis) or joint disease are often used interchangeably to describe this condition but the end result is the same: progressive loss of normal joint function associated with degeneration of the joint cartilage, development of bone spurs, fibrosis and scarring of the joint capsule leading to loss of joint flexibility, pain and ultimately, in the most severe cases, collapse of the joint surface.

X-rays are helpful, but they don't always shoe the full story (you actually need at least a 30% loss in bone density to have an injury show up on x-ray)

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But what can be done to prevent arthritis or slow down its progression? Overall, prevention is better than any of the available treatments or "cures". Although the pain from arthritis can be controlled by joint medications, some of which can slow down he progression of the disease, once arthritis is present it will usually progress in severity over time.

Looking at the horse as a whole, the importance of muscle support and stability to each joint and to the horse's action in general is often underestimated when focusing on injury to the individual joint structures. Although horses have developed down specialized evolutionary pathway such that almost all the muscles are in the upper limb and trunk (i.e. very few muscle fibres below the hock and knee), the effect of these muscles in stabilizing the joints of the lower limb is continued through their associated tendons. These muscles and tendons work to counteract "ground reaction force" which relates to effect that body weight and speed has as the horse's foot contacts the ground. Preventing instability around the joints is one of the many effects of muscle contraction and reduces the stresses that joints are exposed to. Inevitably a tired, fatigued horse is likely to have less motor control and balance and therefore place more stress on their joints and ligaments compared to a fresh, fit and well balanced horse. Factors that lead to overload of the joint surface and concentrate forces onto a small area of the bone are more likely to result in fractures or bone chip formation.

It is well understood that bone physically adapts to the stresses placed onto it (Wolff's law) and therefore appropriate training for the level and type of competition is essential to condition horses and their bone, particularly in the early stages of their career and following any period of rest from exercise (as a degree of loss of strength is expected with any significant period of rest). Although research into the best exercise regimens to prevent joint injury is ongoing, there is good evidence to suggest that exposure to exercise at the end of growth but before skeletal maturity is beneficial in preventing future injuries although adequate time for appropriate recovery and adaptation remains important.

Certain conditions e.g. poor conformation (which can be challenging to correct in the adult horse) and developmental joint abnormalities that begin as a foal or weanling (osteochondrosis for example is a condition where the joint surface fails to form normally resulting in isolated and potentially loose islands of bone and cartilage within the joint surface) predispose to the development of osteoarthritis. Osteochondrosis can cause lameness in its own right due to the irregular defect created in the joint surface but if these fragments become loose and trapped between the joint surfaces, further cartilage damage occurs which will increase the likelihood and severity of osteoarthritis in the future. For this reason, surgical removal of these unstable fragments of bone and overlying cartilage is often recommended to limit the risk of future joint damage.

Early and accurate diagnosis of any joint injury including sprains, chip fractures, cartilage injury and articular fractures will guide early and directed treatment to minimise the long-term effects on joint health. Signs of these types of injury vary but a combination of lameness and significant filling of the joint and/or thickening of the joint lining are often present. Diagnosis of some, more complex, joint injuries e.g. mild sprains of the collateral ligaments can require more advanced imaging (magnetic resonance imaging) although more severe sprains can typically be easily identified using ultrasound and/or radiographs. Ultrasound examination is invaluable in identifying tears to the joint capsule and synovitis.

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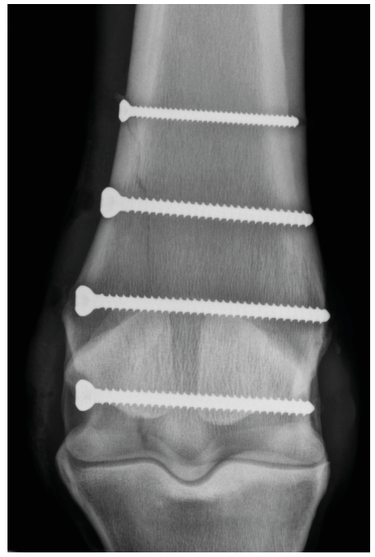

Surgical removal of chip fractures minimises the risk of further damage to the joint that can occur if these chips become loose; loose fragments cause severe cartilage damage by becoming trapped between the joint surfaces or being crushed between the surfaces into smaller fragments. Repair of fractures involving the joint surface e.g. condylar fractures of the cannon bone (which have been increasingly recognised in endurance horses in the last 10 years) can minimise the long-term effect of the injury to the joint by exact re-apposition of the fracture fragments (an orthopaedic jigsaw puzzle in some cases). In complicated (comminuted) fractures, complete reconstruction of the joint surface can be challenging, if not impossible, and a residual defect in the joint surface may remain after surgical repair. This will predispose to arthritic changes developing due to persistent incongruity of the joint surface leading to cartilage degeneration.

In summary, early recognition and diagnosis of stress fractures and joint injuries can prevent long-term and potentially catastrophic complications due to injury. Controlled and targeted training will help minimise the risk of injuries although more research is needed to identify specific forms of training that limit the risk of joint disease. Horses are more at risk of injury if unfit or exhausted as the stabilizing effects of the muscles and tendons on the joints will be lost or minimised, therefore ensuring the horse is ready to compete or retiring early if the horse is struggling on a particular day, can avoid long-term career-limiting injuries that could affect their future. Although osteoarthritis can be managed with treatment, early recognition of the types of injury that can lead to arthritis and managing them appropriately in the early stages can minimise the long-term effect of these injuries on joints.

Osteoarthritis

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