



Flexor Tendon Injuries

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Tendon injuries can occur in all equines - young and old, active and the not so active. But, what does a 'bowed tendon' actually mean? The first step in understanding what can sometimes be a frustrating injury to manage is knowing the anatomy of the horse's lower legs.

Anatomy

The flexor tendons of the horse's lower limb are made up of the superficial digital flexor tendon (SDFT) and the deep digital flexor tendon (DDFT). As there are no muscles found in the lower limbs of horses, these tendons connect the muscles of the upper limb to the bones within the lower leg, enabling the horse to move the lower leg.

The tendons are easily palpated down the back of the leg beneath the knee in the fore limb and the hock in the hind limb. The suspensory ligament, which runs closest to the back of the cannon bone, beneath the DDFT, whilst being a ligament, rather than a tendon, is often grouped in with the two flexor tendons, due to its proximity in location and possible involvement when the flexor tendons are injured.

All three structures run down the back of the cannon bone and need to be immensely strong to withstand the forces that a jumping or galloping horse will put through the lower leg. Tendons are made up of dense elastic connective tissue (collagen), with fibres that run lengthways down the tendons. It is these collagen fibres that allow the tendons to stretch when the horse bears weight through the leg and also allow the tendon to recoil when the weight is removed from the leg.

When the horse is travelling at speed or landing after a jump, the fetlock joint over-extends and the tendon fibres can tear or rupture as a result. Tendon fibres also begin to degenerate with age, weakening the tendon and making injury more likely as the horse gets older.

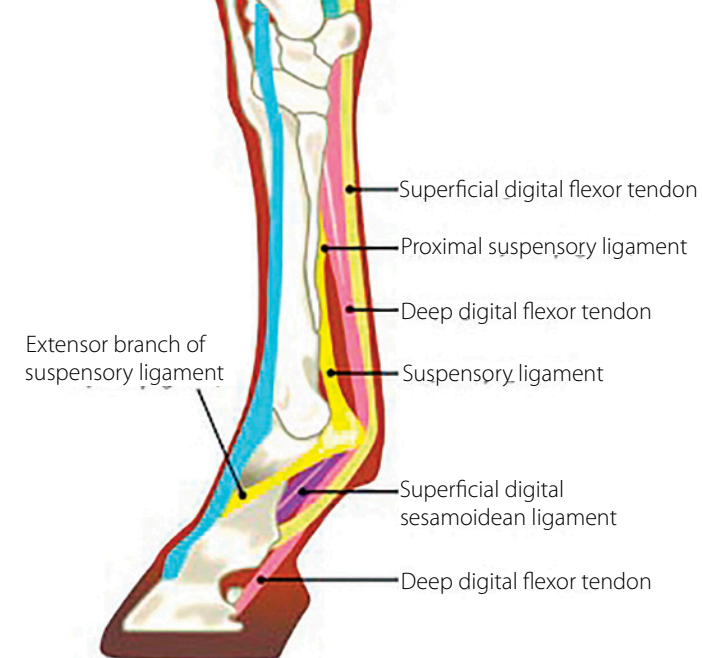
Flexor tendon injuries, resulting from fibre rupture or tearing, range from mild to severe. Horses will present with varying degrees of lameness, which may not be obvious immediately after the injury - i.e. inflammation, heat and swelling over the affected site.

The swelling of both the tendon and the associated soft tissue gives the back of the horse's leg a curved appearance, hence the term 'bowed tendon'. In severe injuries, where one or more of the tendons have ruptured or been transected, (in the case of a severe wound, which cuts through one or more of the tendons) the fetlock position will drop and the toe will point upwards.

Note the dropped position of the fetlock, as well as the toe lifting off the ground, despite the horse weight bearing on the leg.

Diagnosis

The best method to diagnose a tendon injury fully is by an ultrasound examination. An ultrasound will allow the veterinarian to determine which tendons are damaged, as well as determine the



ABOVE: Normal anatomy of the lower limb of the equine.

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extent and the proportion of the collagen fibres that are damaged. The area where tendon fibres have ruptured appears as a dark 'hole' within the tendon on ultrasound. Lacerations or wounds involving the tendons very often can be visualised or palpated through the wound itself.

Treatment

Treatment of tendon injuries is mostly based around rest, and then a gradual reintroduction and return to work. The duration of box rest required and an individually designed training program is best dictated by your veterinarian, and will depend on the degree and severity of the tendon injury. Repeat ultrasound examinations during the healing process also provide a good indication of how the tendon is healing and if the level of exercise can be increased.



ABOVE: The damaged area of the SDFT can be seen on the right of the image as a small dark black 'hole'.

and produce growth factors, similar to platelets. Stem cells can be harvested from the bone marrow within the sternum (breastbone) or from fat to one side of the tail head and can be stored in liquid nitrogen.

Stem cells are injected into the site of the tendon injury with the use of ultrasound guidance and stimulate healing with the intention of decreasing the amount of time taken for the tendon to heal, and also to produce a stronger repair. There has been very few adverse affects with using the stem cells and less than 0.5% local tissue reactions have been reported after injection.

Conclusion

Tendon injuries are, unfortunately, a common occurrence in horses that perform at high levels of athletic competition, and recovery can be aided by injecting stem cells or PRP. However time, rest and, most importantly, patience are the best way to get your horse back into work and competition.



ABOUT THE AUTHOR:
Emily Mabbott graduated from the University of Edinburgh in Scotland. After graduation, she moved to the much warmer climate of Asia and worked at the Hong Kong Jockey Club for four years. After taking some time off travel, she joined the team at WestVETS Animal Hospitals in May 2010. Emily enjoys all aspects of equine veterinary work and has completed further training in equine dentistry. She also enjoys the challenges of the more intensive patients in the equine hospital and equine anaesthesia. In her spare time, Emily can usually be found racing dragon boats and making the most of Queensland's amazing beaches.

Reparative collagen can be functionally weaker and often doesn't offer the level of strength that non-injured tendon fibres provide.

ABOVE RIGHT: A dropped fetlock. Note the dropped position of the fetlock, as well as the toe lifting off the ground, despite the horse weight bearing on the leg.

ABOVE CENTRE: A mild bow to the upper SDFT in a racehorse. This horse was treated with an injection of stem cells, subsequent rest and controlled return to training.

ABOVE RIGHT: Injecting a tendon injury with stem cells under sedation and local anaesthetic with ultrasound guidance.

The rupture or hole within the tendon initially bleeds into the 'hole' and then, over time, reparative collagen fills in the hole. Starting the horse on a low level of exercise, such as a walking in hand for ten minutes twice daily, can help organise the collagen as it heals. However, this reparative collagen can be functionally weaker and often doesn't offer the level of strength that non-injured tendon fibres provide.

This then makes the horse more susceptible to recurrence of the injury when the horse is returned to their previous level of performance.

There are treatments that can be used in conjunction with a controlled rest and exercise regime when faced with a tendon injury. Their main aim is not necessarily to decrease the time it takes for the tendon to heal, but to improve the quality of the healed tendon and, thus, create a stronger tendon where re-injury is less likely to occur.

Platelet-rich plasma


Platelets are found in the blood, where their main use is for blood clotting. They also play a very important part in the

repair process at the sites of injuries by providing a scaffolding for the repairing tissue. When they are injected into a damaged area of tendon, they release growth factors which encourage tenocytes (tendon cells) to mature and improve collagen organisation, with the aim to produce a stronger repair. These growth factors also aid in stimulating new blood supply to the injured area, which assists with healing as blood supply to the tendons is poor in the normal horse.

Platelets can be collected from the horse by taking a blood sample and processing the blood to obtain 'platelet-rich plasma'. This can then be injected into the site of the injury under ultrasound guidance. PRP can be used in both recent tendon and ligament injuries, as well as injuries that have failed to respond to rest and controlled exercise. Most injuries will only require a single injection of PRP.

Stem cells


Stem cells are cells that are found in bone marrow and fat. These cells are undifferentiated and have the ability to develop into any type of tissue, including tendon, bone, ligament and cartilage, etc. They have unlimited potential to replicate



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