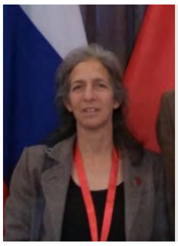

Achieving a definitive diagnosis of pain in the foot in the horse

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Introduction

Reaching a diagnosis of general foot pain in the horse is usually straight forward; however, the bigger challenge is to reach a specific diagnosis of which structure or structures within the foot are causing the pain. The most specific diagnosis possible is important to develop a targeted treatment plan and to provide the client with a prognosis. Some conditions such as a foot abscess or injuries with clear external clinical abnormalities of the foot or pastern regions are easy to diagnose, compared to lameness without any definitive clinical exam findings apart from the lameness. This session will concentrate on lameness cases without any obvious clinical abnormalities which easily localise lameness to a particular area or structure within the foot.

Discerning pain in the foot from pain in the more proximal limb is usually straight forward; however, discerning the exact structure in the foot responsible for the pain can be more challenging. Diagnostic nerve blocks remain the gold standard for diagnosis; however, the perineural and intra-synovial anaesthetic techniques lack anatomic specificity so nerve blocks require careful interpretation.

History and clinical examination

Information regarding the lameness is important such as: suspected limb(s), duration and severity of lameness, any known traumatic incidents and any alterations in shoeing. Identification of the lame limb or limbs is essential, so evaluation of the horse in a straight line and in a circle on a hard and soft surface in each direction is recommended. The degree and character of the lameness provides important clues to the potential differential diagnoses. Moderate unilateral fore foot lameness would have a different list of differential diagnoses compared to a mild bilateral lameness.

Examination of the digit

A careful examination of the digit involves observation of the external structures, from the fetlock distally. Since the horn of the hoof capsule conceals many of the important structures of the equine digit, a clear knowledge of the underlying internal structures is essential so that any external abnormalities detected can be interpreted related to the potential dysfunction occurring within the foot. As two examples, swelling dorsally proximal to the coronary band would indicate effusion of the distal interphalangeal joint and an increased digital pulse would be indicative of an abnormality within the hoof. A sensible routine for clinical examination includes: observation of the horse's stance, comparison of the right and left digits (anatomy, foot balance, shoeing), palpation of the pastern and coronary band regions with the limb weight-bearing and non-weight-bearing, palpation of the hoof capsule, examination of the solar surface of the foot and the application of hoof testers.

Diagnostic anaesthesia

The role of diagnostic anaesthesia cannot be underestimated in the diagnosis of foot lameness; however, the veterinary surgeon must remain aware of the potential for diffusion of the local anaesthetic to surrounding structure or proximal to the site of injection (Nagy et al. 2015). Excellent detailed reviews of the techniques for perineural and intra-synovial diagnostic techniques are available (Bassage and Ross 2011, Schumacher et al. 2013). In addition, the equine literature contains multiple articles that detail the potential diffusion distances and locations for the perineural and intra-synovial diagnostic nerve blocks of the equine digit (Schumacher et al. 2013, Pilsworth and Dyson 2015).

Perineural (local) anaesthesia

The palmar digital and abaxial sesamoid nerve blocks are the main perineural techniques used to diagnose general foot pain in the horse. These blocks should be performed with the smallest amount of local anaesthetic needed, in an effort to limit diffusion of the local anaesthetic proximally; however, some diffusion may still occur. In the majority of cases, a positive response the palmar digital nerve blocks (significant improvement or abolition of lameness) would indicate that pain associated with lameness was within the structures contained in the hoof capsule. When a positive response is found to the abaxial sesamoid nerve block, the lameness may also include structures of the palmar pastern region as well as the foot and the coffin joint. On occasion, these blocks can also desensitize the fetlock joint region, leading to a conclusion of foot pain when a problem is present proximal to that region.

Intra-synovial anaesthesia

Once the lameness is localised to the digit, intra-synovial diagnostic anaesthesia can help to further localise the lameness; however, these intra-synovial techniques are not easy to interpret. Diagnostic anaesthetic placed in distal the interphalangeal (DIP, coffin joint) can diffuse into the navicular bursa (NB), leading to desensitisation of both structures (DIPJ and navicular bursa). In addition, the nerves adjacent to the collateral sesamoidean ligaments may be in contact with the local anaesthetic, so desensitisation of the palmar/plantar extra-synovial structures may occur. Duration of time between placing intra-articular diagnostic anaesthesia in the DIPJ and observation of the horse could influence the conclusions, therefore the general recommendation is to reassess the lameness within 5 minutes following the block. A rapid response has been thought to indicate pain originating from the DIPJ.

Local anaesthetic delivered into the NB demonstrated less diffusion into the DIPJ compared with diffusion into the NB when the DIPJ is injected (Gough et al. 2002). Therefore, the NB block appeared more specific for this synovial structure, compared to the DIPJ block. The NB block should be performed with a small amount of contrast material to ensure correct placement of the local anaesthetic, and to facilitate correct interpretation of the block. Recent work further exploring the confusion of intra-synovial anaesthesia of the foot demonstrated that DIPJ analgesia took longer to improve a foot lameness, compared to more rapid improvement following a NB block (Katrinaki et al. 2023).

The above short description provides an outline of the challenges associated with localising lameness of the equine digit to a specific area of the foot. Proximal diffusion from perineural blocks and diffusion between synovial and extra-synovial structures occurs and should be considered when interpreting nerve blocks of the foot. The diagnostic anaesthesia remains an important step in reaching a diagnosis of foot lameness; however, a definitive diagnosis requires interpretation of diagnostic imaging (radiography, MRI, CT, PetCT) in relation to the nerve block results.

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Dr Ellen Singer BA DVM, DVSc., Diplomate ACVS/ECVS, FRCVS

Ellen graduated from Tufts University School of Veterinary Medicine (1987), after which she spent three years in general equine practice in the Northeast United States. Following a Surgical Residency and Doctor of Veterinary Science Degree at the Ontario Veterinary College, Ellen worked at the Koret School of Veterinary Medicine in Israel. In 1995, Ellen joined the University of Liverpool where she was Senior Lecturer and a key member of the Orthopaedics and Surgery team for 22 years. Ellen then worked as an orthopaedic and surgical consultant, until accepting a position as a Surgeon at the Sussex Equine Hospital (February 2023). Ellen has Diplomate status in the European and the American College of Veterinary Surgeons and was honoured to become a Fellow of the RCVS in 2018. Ellen's main passion is surgery and the equine athlete. Clinical interests are primarily lameness diagnosis and orthopaedic surgery, but she also loves colic surgery, the reason she became interested in being a surgeon in the first place. Ellen's research projects have included clinical projects related to common orthopaedic problems and surgical anatomy, as well as more basic science projects that focus on the biomechanics of bone in the fetlock joint, in particular the bone biology of the first phalanx and the response of this bone to exercise. Ellen loves nothing more than figuring out why horses are lame and providing a practical and hopefully, successful solution for the horse's owners. Ellen continues to be amazed at the varied athletic capabilities of the horse, and by this creature's generous nature.

Managing hoof wall defects

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Introduction

Full thickness hoof wall defects such as quarter and toe cracks, result in a loss of the structural integrity of the hoof wall. They are not uncommon in equine practice and often manifest in lameness. Successful management of these hoof wall defects involves identifying and addressing the underlying cause(s), stabilization of the foot, and committed follow-up [1,2]. Treatment is most successful when the cause is investigated, the appropriate farriery is initiated as early as possible, and when the biomechanical properties of the foot are thoroughly understood. Inadequate attention to these factors accounts for the many failures encountered and the recurring nature of hoof wall defects. The two generally encountered defects are quarter cracks and toe cracks both of which originate at the coronet and migrate distally. Both of these hoof wall defects often lead to infection, lameness and are a common cause of decreased athletic performance in competition horses. Hoof wall defects are generally associated with a hoof capsule distortion, for example, with a quarter crack, the distortion will be associated with a sheared heel on the affected side [3]. There is a myriad of materials and techniques described for repairing hoof cracks, but none will be successful unless the cause of the hoof wall defect is determined and addressed through the appropriate farriery [1,2,3]

Pathophysiology of Quarter Cracks and Toe Cracks

Many causes for full thickness quarter cracks and toe cracks have been described including coronet injuries, inappropriate farrier practices, poor quality hoof walls (because of genetics, nutrition, and/or environment), white line disease, and hoof capsule distortion. In the author's experience, the most common underlying cause of full thickness quarter cracks and toe cracks is a hoof capsule distortion [4].

Quarter Cracks

It is well accepted that the hoof capsule adapts and changes shape according to how it is loaded. Faulty limb conformation adversely affects how the hoof is loaded, and habitual disproportionate loading will change the shape of the hoof capsule over time. The resulting distortion of the hoof may negatively affect its mechanical behavior, resulting in abnormal force and stress within its tissues. The hoof capsule distortion most associated with a full thickness quarter crack is a sheared heel. A sheared heel is defined as a hoof capsule distortion resulting in a proximal displacement of one quarter/heel bulb relative to the contralateral side of the hoof [3,5]. If the changes in forces and stress become excessive, the hoof wall will be predisposed to injuries such as a full thickness quarter crack.

Toe Cracks

Full thickness toe cracks originate at the coronet at the center of the dorsal toe and extend distally. There is generally a proximal to distal concavity present in the dorsal hoof wall. The crack will open when the foot is unloaded and close when the load is applied to the foot. Toe cracks are generally seen in horses with excessively upright or club feet [2]. With this conformation, the heels are generally allowed to migrate dorsally and/or the shoe is too small. This limits the solar surface of the foot in the heel area and places further load and leverage on the toe section of the foot.

Management of Quarter Cracks

Affected feet should be trimmed appropriately using the guidelines of a parallel hoof-pastern axis, center of rotation bisecting the weight bearing surface of the foot, and the heels of the hoof capsule extending to the base of the frog or trimming the heel area to ensure the frog and the hoof wall are on the same plane.[1]

If the situation permits, the horse's shoes should be removed, the feet are trimmed as described above and the horse is then stood on a hard surface for at least 24 hours prior to trimming and shoeing. This allows the affected side of the foot to settle into a more acceptable conformation prior to completing the farriery. A "double trimming" technique can be used where the affected foot is first trimmed as described above, a shoe is fitted and then before attaching the shoe, a second trim is performed under the proximally displaced quarter/heel. The second trim begins at the ipsilateral toe and is trimmed in a tapered toward the heel. The foot is then shod with a symmetrically fitted wide web steel straight bar shoe, with the trim creating a space that resembles a wedge between the affected quarter/heel and the shoe. This will effectively unload the distorted side of the foot

Ideally, horses with full thickness quarter cracks should be taken out of work allowing time for inflammation to resolve and the crack to begin to be replaced by new wall at the coronet before they are repaired. If the horse has to continue in work, my preferred technique for stabilizing quarter cracks involves inserting an implant composed of stainless steel wires first, and then reinforcing the wires with a "patch" consisting of a mix of fiberglass strands and polymethylmethacrylate adhesive (Equilox® Pine Island, MN).

Management of Toe Cracks
A toe crack associated with an upright or club foot hoof conformation should be trimmed to establish a parallel hoof-pastern axis along with attempting to shift the load away from the toe and onto the palmar section of the foot. This can be accomplished by beginning the trim in the middle of the foot and trimming the foot in a tapered fashion toward the heels. The concavity is removed from the outer dorsal hoof wall and a larger size shoe is applied.

Toe cracks can be stabilized, if necessary, using a metal plate that bridges the crack and is anchored on each side of the crack with screws. A lightweight, approximately 3X8 cm metal plate (steel, aluminum, or brass) is used. The plate is bent to conform to the contour of the coronary band and the curvature of the hoof wall and is positioned approximately 1cm distal to the coronary band. The plate is applied with small sheet metal screws. It is extremely important to attach the plate with the foot off the ground to ensure the defect is affixed in the open position to reduce any compression on the dermal papillae producing horn tubules that will hinder healing.

Summary
Quarter and toe cracks which result in loss of the structural integrity of the hoof wall are not uncommon and usually manifest in lameness. From the perspective of pathogenesis and stabilization, these cracks should be thought of as "wall fractures". From the perspective of healing, the cracks can only be eliminated by new stable growth at the coronet. Successful management involves identifying and addressing the underlying cause(s), applying the appropriate farriery, stabilization of the defect, and committed follow-up in order to prevent reoccurrence.

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Stephen E. O'Grady, DVM, MRCVS
The first title 'Managing hoof wall defects' is perfect. The second title 'Radical hoof surgery for laminitis' presents a problem. I am not familiar with any radical hoof surgery other than the resections that were performed years ago, nor do I practice any radical procedures in my own practice. I have an extensive podiatry practice and the only surgery I do for laminitis is an occasional DDF tenotomy.

As an alternative, I would like to suggest 'Understanding barefoot methodology: advantages and limitations. I have always used barefoot methodology as an option to rehabilitate hoof capsule distortions with great success. I published a paper on this topic in 2015 in EVE. Since the Olympics in Japan where the gold and silver medal winners in the jumpers were barefoot, there has been a renewed interest in competing horses without shoes. This has become popular in Europe and currently, there is a study going on in Sweden. Allowing the horse to compete barefoot for many varied reasons is a viable option to traditional farriery. However, there is a process…determining if the hoof has the structural integrity or can the current structures be improved to remain barefoot, an adaption period that is required, and the hoof care needs to be modified…all of which would be described in the paper. I currently have over seventy upper-level competition horses competing barefoot. To summarize, the paper would describe both using barefoot methodology to rehabilitate problem feet and why/how it can be used in competition horses.

Description of the most common sport induced foot injuries in Chilean Rodeo Horses:

David Parra Gaete, MV, Director Clínica Veterinaria Las Troyas
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Chilean Rodeo is one of the most demanding equine sport disciplines there is andit is the only athletic activity where horses compete 3 times on one lead (going to the right) and only one time on the left lead. In addition, in order to achieve their task, these horses must canter sideways and then suddenly push forward, doing this several times in a single 2 or 3 day meet or show.

This type of physical effort induces a high number of foot related injuries in the front limbs, where the colateral ligaments and podotroclear apparatus suffer the most, but with a certain pattern and presentation we don't see in other disciplines.

Advanced imaging such as MRI was introduced in our country 2 years ago and it has helped us tremendously to better characterize these lesions.

This talk will focus on the description of the most common, significant and many times career ending injuries specific to the discipline and to this anatomical area.

David Parra

MV egresado de la universidad de chile el año 2001. ejerciendo en práctica privada con foco exlusivo en ortopedia equina en chile, emiratos árabes, europa y estados unidos. veterinario de múltiples equipos nacionales de enduro, equitación y adiestramiento en campeonatos internacionales. instructor de alapile desde que esta organización internacional de educación continua fue formada hasta la fecha. socio propietario de clinica veterinaria equina las troyas fundada en el año 2012.

Lameness arising from the digital flexor tendon sheath

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Lameness associated with the digital flexor tendon sheath (DFTS) is common and usually presents as asymmetric synovial effusion, often accompanied by pain on palpation in the acute stages. Diagnostic analgesia is used to confirm the location of the lameness to the DFTS by the instillation of local anaesthetic solution via one of the four access sites of the sheath. The easiest and most reliable access can be gained via the distal palmar pouch of the sheath, which extends between the two distal branches of the SDFT and between the two digital annular ligaments, along the palmar surface of the deep digital flexor tendon (DDFT). The needle can be introduced through the skin to one side of the midline and, to avoid iatrogenic damage to the deep digital flexor tendon, gently and slowly advanced at approximately 45 degrees to the skin surface until synovial fluid is seen at the needle hub. 7-10mls of local anaesthetic solution is injected for adequate desensitization of the DFTS. However, it is now routine to combine diagnostic analgesia with contrast tenography because it can indicate injuries to specific structures within the DFTS and indicate possible palmar/plantar annular ligament constriction. For this, 5mls of a water-soluble iodine-containing contrast agent is combined with 10mls local anaesthetic and a lateromedial radiography obtained after walking the horse for a few steps.

Ultrasonography is effective at identifying mid-substance pathology within a tendon sheath. However, intra-thecal DDFT tears are more difficult to identify and it can also be challenging to determine whether mid-substance injuries communicate with the synovial environment. Improvement in identifying tendon tears is achieved by using non-weight-bearing views and assessing the DDFT in oblique images obtained just distal to the proximal sesamoid bones, and displacement and thickening of the manica flexoria in longitudinal (and transverse) mid-line scans at the level of the apices of the proximal sesamoid bones. Movement of the tendons can also be assessed in non-weight bearing views where gapping between the tendons can signify adhesion formation or a fully torn manica flexoria.

Magnetic resonance imaging has superior soft tissue contrast and may be of use to identify occult lesions not seen radiographically or ultrasonographically. However, the standing MRI images may have inferior quality, especially in hindlimbs, because of greater movement artefacts which makes the diagnosis of intra-thecal tendon tears difficult. Tenoscopy is the best imaging modality for evaluating the internal structures of tendon sheaths.

Specific conditions and treatments

1. Primary tenosynovitis

While a common diagnosis in the past, better imaging and the advent of tenoscopy has revealed that the majority of tenosynovitis cases are secondary to an intra- or peri-thecal soft tissue injury. Traumatic tearing of the wall of the tendon sheath does occur [1]. Most of these will heal spontaneously with rest but a small proportion can progress to the formation of a synovial outpouching or synoviocoele. They are not always significant but can cause pain and lameness if non-compressible when the limb is raised. Treatment is best achieved by tenoscopic enlargement of the synovioceole opening using ultrasound guidance [2].

2. Palmar/Plantar annular ligament syndrome

Reduced contrast within the fetlock canal and the ease of passage of the arthroscope through the fetlock canal are the best ways of determining constriction by the palmar/plantar annular ligament. Constriction of the PAL is usually secondary to other pathology within the digital sheath and hence transection should only be performed with concurrent tenoscopic evaluation of the sheath.

3. Mid-substance tendon lesions

Mid-substance lesions are those within the superficial digital tendon tendon (SDFT) or DDFT within the extent of the DFTS. They can be managed conservatively but, as they are contained, they lend themselves to intra-tendinous administration using the orthobiologicals. Ideally, in this location, such intra-tendinous treatments should be performed under combined tenoscopic and ultrasonographic control because of the difficulty in identifying any surface defects pre-operatively through which the product could leak, thereby reducing its potential benefit.

4. Tendon/ligament tears which communicate with the synovial cavity

a) Deep digital flexor tendon tears

The deep digital flexor tendon can be injured throughout the length of the digital sheath. These injuries can be either mid-substance tears where only hyperaemia may be evident tenoscopically or have marginal tears which are usually where the tendon is under maximal compression, at the level of the fetlock joint. Treatment of these injuries involves debridement of the tear and removal of the torn fibres using a synovial resector and/or arthroscopic scissors or suction punch rongeurs. However, it is rarely possible to leave the defect completely free of prolapsed tendon fibres and subsequent healing of the defect is limited within the synovial environment resulting is a guarded prognosis, varying from 18%-40% depending on extent [3, 4].

b) Manica flexoria tears

The manica flexoria is a thin loop of tendon tissue that is attached to both medial and lateral borders of the superficial digital flexor tendon and surrounds the deep digital flexor tendon within the proximal digital sheath. With the advent of tenoscopy, tearing of one or both of the attachments of this structure to the superficial digital flexor tendon has been found to be a common cause of digital sheath tenosynovitis and lameness, most commonly in the hindlimb. The tear will not heal and recurrent lameness is common with conservative management. Hence the best treatment is for the manica flexoria to be removed, which can be done tenoscopically. In contrast to the deep digital flexor tendon tears, these cases carry a good prognosis of approximately 80% returning to the same level of performance after surgery [3, 5].

c) Ligament tears into the digital sheath

The straight and oblique, distal sesamoidean ligaments lie on the dorsal border of the DFTS and injuries frequently blocked to DFTS diagnostic analgesia [6]. Most of these injuries are managed conservatively but when they communicate with the digital sheath cavity and so are amenable to tenoscopic debridement. These lesions can be debrided as for DDFFT tears. The proximal scutum can also tear into the sheath and be managed in the same way tenoscopically.

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Roger Smith is Professor of Equine Orthopaedics at the Royal Veterinary College (RVC) with particular interests in orthopaedic surgery, imaging, lameness, and tendon research. He qualified with a First from Cambridge University in 1987. After 2 years in general practice, he undertook a residency in equine surgery at the RVC and then a PhD on the extracellular matrix of equine tendons. He remained at the RVC and was appointed Professor in December 2003. He holds the Diploma of Equine Orthopaedics, is Diplomate of two European Specialist Colleges (Veterinary Surgery (ECVS) and Veterinary Sports Medicine and Rehabilitation), and is a Royal College of Veterinary Surgeon's Specialist in Equine Surgery. He was awarded an RCVS Fellowship in 2016 and was ECVS President in 2017. He is currently President-Elect of British Equine Veterinary Association.

Podiatric management for lower limb lameness contitions

Tracy A. Turner, DVM, MS, Dipl.ACVS, Dipl.ACVSMR
Turner Equine Sports Medicine and Surgery

The effect of hoof imbalance on fore limb lameness has been well documented. The fore limb hoof has little effect above the fetlock. But the rear hoof has much greater effect on the upper leg and back. The purpose of this paper is to discuss the common hoof imbalances that have been described in the rear hoof, compare those to the fore foot, discuss possible pathophysiology and finally discuss the effect these rear hoof imbalances have on lameness of the rear leg.

Different biomechanics exist between the forelimb and rear limb. Also rear hoof biomechanics effect the movement (biomechanics) of the upper limb perhaps and these alterations in biomechanics can result in lameness.

The most successful approach to shoeing is that based on individual case needs rather than a standard formula. The following principles should be followed: (1) Correct any pre-existing problems of the hoof, such as underrun heels, contracted heels, sheared heels, mismatched hoof angles, broken hoof/pastern axis. (2) Use all weight bearing structures of the foot. (3) Allow for hoof expansion. (4) Decrease the work of moving the foot. Shoeing is most effective when corrections are made within the first 10 months of lameness, up to 96% success. This is in contrast to when shoeing changes are not made until after 1 year of lameness, where only 56% of the cases have been successfully treated.

These principles can be accomplished using many different methods and techniques. Shoeing is of utmost importance in dealing with hoof pain causing the signs associated with navicular syndrome or remodeling of the bone (osseous form). It is necessary to ensure proper hoof balance and support in order to eliminate the pain and stop or decrease the stresses that are causing the problem.

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Tracy A. Turner, DVM, MS, Dipl.ACVS, Dipl.ACVSMR

Tracy Turner began his professional career as a farrier and used those skills to help finance his education. He received his DVM degree from Colorado State University in 1978. He completed an internship at the University of Georgia and a surgical residency as well as a Master of Science degree at Purdue University in 1981. His Master's thesis was "Thermography of the Lower Limb of the Horse." He served on the faculty of the Universities of Illinois, Florida and Minnesota. At Minnesota, he was Head of Large Animal Surgery and attained the rank of full Professor before leaving academics to join Anoka Equine Clinic in 2004. In 2016, he started his own practice dedicated to Sports Medicine and Surgery.

Turner's primary research efforts have focused on equine lameness with particular interest in equine podiatry, back issues in horses, rehabilitation and thermography. His podiatry research has evaluated the radiographic and morphologic characteristics of hoof imbalance, as well as the differential diagnosis of palmar foot pain (PFP) and the development of PFP treatment strategies. Turner has researched the use of diagnostic imag-

ing techniques for evaluation of equine back problems (including saddle fit) and developed epidemiological data on overriding spinous processes in horses. He pioneered the use of thermography as a diagnostic aid in lameness evaluation, as well as its use in horse welfare regulation. Turner has extensively published on these topics and been invited to lecture nationally and internationally. In 2004, Turner was inducted into the International Equine Veterinarian's Hall of Fame.

Turner is a Diplomate of the American College of Veterinary Surgeons, a Diplomate of the American College of Sports Medicine and Rehabilitation and is a Fellow of the American Academy of Thermology (AAT). He is an active member of the AVMA, AAEP, AAT and the American Horse Council. Turner has served as chairman of the AAEP's Farrier Liaison Committee, served on the AAEP Foundation Advisory Council, the AAEP Educational Programs Committee and the AAEP Board of Directors. He is currently Vice-President of the AAEP. He is past-president of the American Academy of Thermology. He has consulted for United States Equestrian Federation, The USDA Horse Protection and Federation Equestriene Internationale (FEI). He has served as a Veterinarian Official at 4 Pan America games, 2 World Equestrian Games, at the 2016 Olympic Games in Rio de Janeiro and 2021Tokyo Olympics. He has participated as an instructor at Equitarian Workshops in Mexico, Nicaragua, and Costa Rica and has participated in the Equitarian projects in Honduras, Costa Rica and Peru. He is married to veterinarian Julia Wilson and has two sons. He loves the outdoors and rides whenever possible.

SOFT TISSUE LESIONS OF THE DIGIT

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The equine digit includes the region distal to the fetlock joint, wit the first, second and third phalanx as skeletal frame. It is a region of utmost clinical importance in horses involved in all equestrian and racing disciplines and its soundness is paramount for performance.

Soft tissues associated with the digit are numerous and all exposed to possible pathological entities. The anatomy of the region is complex and its thorough knowledge, including its biomechanics, is a prerequisite to understand the aethiopatogenesis, and formulate diagnosis, prognosis and rational for treatment of different clinical conditions. The following is a list of the soft tissues of the equine digit, which can all be affected by injury:

- Tendon of common and lateral digital extensor tendon;
- Proximal and distal digital annular ligament;
- Distal sesamoidean ligaments (short, cruciate, oblique, straight) and extensor branches of the suspensory ligament;
- Superficial and deep digital flexor tendon and distal portion of the digital flexor tendon sheath;
- Joint capsules and synovial lining of the proximal and distal interphalangeal joints;
- Collateral and palmar (axial and abaxial) ligaments of the proximal interphalangeal joint);
- Collateral ligaments of the distal interphalangeal joints;
- The middle scutum and associated (scutocompedal) ligament;
- The navicular bursa and associated ligaments (collateral sesamoidean ligament, impar ligament);
- Collateral cartilages and associated ligaments (chondroungueal, chondrosesamoidean, chondrocoronal and chondrocompedal);
- Digital cushion;
- Dermal laminae and papillae responsible for growth of the hoof capsule.

Clinical examination and dynamic assessment is the first step in diagnosis of injuries associated with the digit; diagnostic anesthetic blocks remain a mainstay in the diagnostic investigation, although their specificity has been proved to be relative in accurately identifying the source of lameness.

Diagnostic imaging has been revolutionized by the advent of Magnetic Resonance Imaging (MRI) since the last decade of the last century, particularly in the foot region. Accurate and careful use of first level diagnostic imaging, particularly ultrasonography is however still fundamental in the initial screening and will often allow a definitive diagnosis, avoiding more expensive and not always available second level imaging such as MRI. A notable exception to this is diagnosis of deep digital flexor tendon injuries within the foot where MRI is usually the only technique allowing precise imaging and quantification of lesions.

Most common soft tissue injuries of the digit in our caseload are those affecting the deep digital flexor tendon within the foot or in the pastern region, collateral ligaments of the distal interphalangeal joint, the oblique sesamoidean ligaments, the branches of the superficial digital flexor tendon, straight sesamoidean ligament.

Therapy for injuries of soft tissue injuries of the digit involves rest and adjunctive treatments such as steroid injections or intralesional injections of biologic agents. Adequate foot care and corrective/therapeutic shoeing is a cornerstone of treatment and failure to understand the rationale of biomechanics and shoeing strategies will have a negative impact on the outcome.

Soft tissue injuries of the digit can be career ending but correct diagnosis and therapeutic management will often allow recovery or ability to cope with chronic wear and tear disease.

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How to treat deep digital flexor tendon injuries more accurately and effectively:

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Tendinopathies of the deep digital flexor tendon are a very common cause of lameness in sport horses. Our athletic horse population is affected by the same types of injuries that have been widely described in different studies and treatment of these lesions strongly depends on the accurate localization of the site of injury or injuries in the same tendon at different levels and the characterization of these (extensive; mild, moderate, severe,etc). However, we have seen a more specific discipline induced presentation of injury in our Chilean Rodeo horses.

To describe DDFT lesion location in a proximodistal direction, four levels were established. Level 1 was proximal to the collateral sesamoidean ligaments and to the proximal recess of the navicular bursa in the sagittal plane. Level 2 corresponded to the level of the collateral sesamoidean ligaments and proximal recess of the navi- cular bursa. Level 3 was between the proximal and distal extents of the distal sesamoid bone. Level 4 extended from the distal border of the distal sesamoid bone distally.

The anatomy of the digit and association of the DDFT with other structures provides an explanation for the presence of multiple sites of injections. Within the hoof capsule the DDFT is moulded to the palmar surface of the navicular bone and separated from it by the podotrochlear or navicular bursa. The distal recess of the bursa separates the DDFT and the distal sesmoidean impar ligament (DSIL) (Dyson 2003). The DDFT has a terminal fan like expansion containing cartilage that occupies the entire space between the medial and lateral palmar processes of the distal phalanx and inserts on the facies flexoria and semilunar crest of the distal phalanx. The dorsal portion of the DDFT joins with the DSIL immediately before insertion on the facies flexoria of the distal phalanx (Dyson 2003) and understanding the normal anatomy is essential for the detection of abnormalities, injuries and potential sites of local therapy.

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