Manual Therapies in Sport Horses with poor performance: How to address the issue?

Introduction:

Considering in general that the horse is a sport animal in various disciplines such as racing, jumping, endurance, dressage... Poor athletic performance is one of the most frequent problems in the horse's daily life. It is no wonder that it is a daily concern in veterinary practice. Therefore, addressing these types of issues from an osteopathic standpoint is of great importance both in prevention and treatment.

For a long time, and even today, the treatment of underperformance in sport horses has been focused on medical and surgical options, often overlooking the benefits of manual therapies and rehabilitation protocols. It is essential to consider various approaches to enhance their maximum level of performance.

In this thesis, the importance of manual therapies in improving the performance of horses and aiming to optimize their recovery will be explored.

Osteopathy principles:

Dr. Andrew Taylor Still, who is the founder of the osteopathy, formulate the four main principles of osteopathy medicine:

1. The Body is a Unit: This first principle reflects the idea that the body is a unified whole, an integrated organism in which no part function independently. A dysfunction in a part can affect other areas of the body.
2. The Body is Self-Healing: Still believed that the body has an inherent capacity to maintain its own health.
3. Structure governs function: Structure and function are interrelated, so any alteration in structure can affect function.
4. The rule of artery is supreme: This principle emphasizes the importance of good blood circulation to deliver immune cells, oxygen, nutrients, and remove waste products from areas of the body. In other words, maintaining an optimal blood flow is a fundamental aspect of supporting the body's innate ability to heal itself.

Benefits of osteopathy:

Osteopathy, a form of manual therapy with a long history of use in both humans and animals, offers several notable benefits:

- Pain Relief: Osteopathy can effectively alleviate pain in various parts of the body.
- Improved Circulation: This therapy can stimulate blood circulation, promoting better healing capabilities.
- Correction of Restrictions: Osteopathy enhances mobility through manipulative techniques.
- Individualized Treatment: Osteopaths tailor their approach to each patient based on their specific issues and medical history.

- Safe Treatment: When performed correctly, osteopathy is a safe manipulative therapy that doesn't lead to adverse effects.
- Complementary to Conventional Medicine: Osteopathy can be used alongside conventional medical treatments to improve overall outcomes.

Causes of Poor Performance in Horses:

Poor performance can encompass various clinical signs including reluctance to work, exercise intolerance, a decline in the ability to perform certain athletic tasks, and sometimes the horse is not meeting expectations. (L. Ellis, 2021)

While there are various causes that can affect the performance of our sport horses. While some of these factors, like genetic predispositions or training methods, may not be directly treatable through osteopathy, there are specific issues that can be effectively addressed using these techniques. Two primary concerns in this regard are lameness and musculoskeletal problems.

1. Lameness: Lameness refers to an abnormality in a horse's gait, and it can significantly hinder a horse's performance. The root of this problem often originates from issues within the musculoskeletal system, including imbalanced muscles and stiff joints.
2. Musculoskeletal Issues: Sport horses are prone to a range of musculoskeletal problems, including muscle strains, joint inflammation, and tendon/ligament injuries. These issues can result from the rigorous demands of athletic training and competition.

Manual Therapies for Improving Performance in Sport Horses

- **How to get start:**

When faced with a case of a horse experiencing a poor performance, the history of the horse, including its activities, competition level, and when the problem started, should be gathered first. Afterwards, the visual inspection of the horse should be conducted, preferably observing its behavior inside the stall, while also paying attention to any signs of behavioral issues. The horse can be taken out of the stall for analysis of its body condition, balance, and the presence of any swelling areas or anything noteworthy. Once the visual inspection is complete, the palpation exam of the animal should be carried out, always following the same order to ensure no structure is overlooked. After that, the horse's walking, trotting in a straight line, and lunging should be checked. Once the physical examination is complete, the osteopathic examination should be performed, during which the different structures (joints and soft tissues) are palpated and mobilized to identify any pain, muscle hypertonicity, soft tissue or joint restrictions. When the osteopathic diagnosis is established, a treatment plan will be formulated and consideration will be given to the manual therapies to be applied.

Based on the findings, in conjunction with the medical history and previous clinical examination, appropriate manual therapies will be selected.

- **Manual therapies:**

Table 1
Potential indications for application of various equine manual therapy techniques

Manual Therapy Technique	Indications
Touch therapies	Pain
Massage	Muscle hypertonicity, soft tissue restriction, pain
Stretching	Soft tissue restriction, joint stiffness
Soft tissue mobilization	Soft tissue restriction, pain
Joint mobilization	Joint stiffness, pain
Joint manipulation	Joint stiffness, pain, muscle hypertonicity

(K. Haussler, 2010).

Touch therapies: Anecdotally, it is believed that touch-based therapeutic approaches have the potential to enhance the behavior, performance, and overall well-being of horses, as well as strengthen the bond between the horse and rider. However, there is currently a lack of controlled studies to substantiate these claims.

Massage therapy: Massage therapy is characterized as the manual manipulation of the skin, muscles, or superficial soft tissues through techniques such as rubbing, kneading, or tapping, or through the use of tools or mechanical devices like mechanical vibration, all for therapeutic purposes.

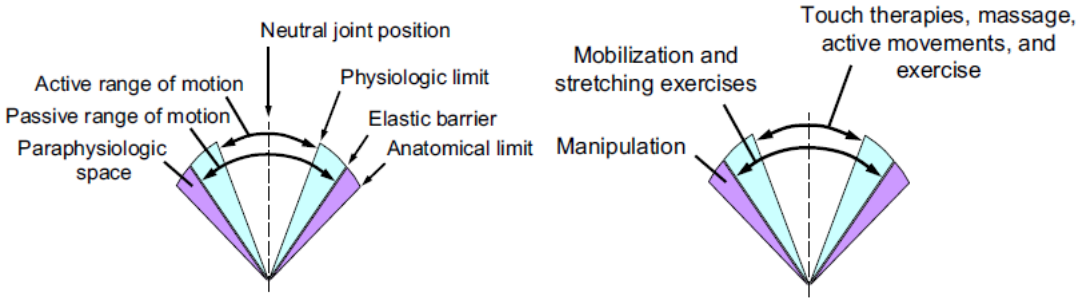
Passive stretching: Passive stretching consists of applying forces to a limb or body segment to lengthen muscles or connective tissues beyond their normal resting lengths, with the intent of increasing joint range of motion and promoting flexibility.

- **Defining the Two Key Concepts of Manual Therapies: Mobilization and Manipulation**

It is important to establish a clear understanding of the two fundamental concepts: mobilization and manipulation, because joint mobilization and manipulation provide important diagnostic and therapeutic approaches for addressing musculoskeletal issues in equine sports medicine and rehabilitation.

- Joint mobilization: Joint mobilization refers to the repetitive, controlled movement of a joint within its natural range of motion, aiming to bring back a regular and symmetrical range of motion in the joint. This technique is used to stretch connective tissues and regain the typical feeling or sensation when the joint reaches its full extent of movement. (K. Haussler, 2016).
- Joint manipulation: Joint manipulation is a hands-on technique where a deliberate and precise force is applied to a joint or a specific vertebra, causing it to move beyond its normal and natural range of motion. This method is employed to address issues related to joint mobility and function. (K. Haussler, 2016).

However, all forms of manual therapy are characterized by applying variable gradations of manual force and degrees of soft tissue or articular displacement (K. Haussler, 2010).



(K. Haussler, 2010).

The combination of these images is highly illustrative as it enables visualization of the specific areas where each applied technique is employed.

According to the functional classification, an assessment will be made on how to approach each of the situations that may be encountered.

- **Functional classification of the problems:**

From the functional perspective, general rehabilitation issues it be addressed in equine athletes include, in progression order: (1) Pain management, (2) Proprioceptive deficits, (3) Stiffness, (4) Weakness or fatigue, (5) Neuromuscular control (K. Haussler, 2018).

PAIN MANAGEMENT:

Horses can experience various levels of discomfort that can impact their performance in sports. It's crucial to understand how to handle the situation, depending on whether the pain is acute or chronic.

For acute pain and inflammation, the usual approach involves the use of nonsteroidal anti-inflammatory drugs (NSAIDs), cold therapy, limiting physical activity, and employing compression wraps. After a period of 3 to 5 days, gentle passive mobilization of soft tissues or joints becomes appropriate. This joint mobilization is typically performed gradually, with each level increasing the range of joint movement. If moving the joint passively is too painful, applying gentle pressure and inducing movement of the skin and underlying tissues may be helpful. While there's no conclusive scientific evidence supporting the effectiveness of therapeutic touch in horses, some anecdotal reports suggest it might enhance equine performance.

On the other hand, chronic pain often leads to sensitization or wind-up, resulting in generalized pain that is challenging to pinpoint accurately. Massage therapy, defined as the manipulation of the skin, muscle, or superficial soft tissues either manually or with an instrument or mechanical device for therapeutic purposes, has been shown to be effective by reducing stress-related behavior and lowering mechanical nociceptive threshold within the thoracolumbar region (K. Haussler, 2018).

Research indicates that Osteopathic manipulative treatment is most often used to treat restricted range of motion and least often to treat tenderness or pain. These findings coincide with the biomechanical model of osteopathic medical practice and align with efforts to reduce pain impact rather than merely focusing on pain intensity (C Licciardone, 2020).

STIFFNESS:

A significant factor contributing to decreased performance in horses is stiffness in the neck or back. This stiffness can either originate from issues in another part of the body or be a reaction to a problem in the neck or back region itself. When horses experience neck or back pain or stiffness, it's common to observe muscle spasms or increased muscle tension. Stiffness that is concentrated in a particular joint is typically a result of the formation of fibrous tissue in the joint capsule or adhesions around the joint. Passive ROM exercise is a specialized hands-on technique of joint and soft tissue mobilization used to reduce stiffness and encourage joint movement. Usually, the joint is repeatedly guided through its normal physiologic range in sets of 10 repetitions (Porter, 2005).

Active stretching involves using the patient´s own movements to induce a stretch, whereas passive stretches are applied to relaxed muscles or connective tissues during passive soft tissue or joint mobilization (K. Haussler, 2018).

Spinal mobilization has been shown to be effective at increasing spinal flexibility in riding horses without clinical sings of back pain. Manipulation may preferentially stimulate receptors within deep intervertebral muscles, whereas mobilization techniques most likely affect more superficial axial muscles (K. Haussler, 2018).

WEAKNESS

It can manifest as a lack of energy, reduced muscle tone, difficulty in carrying out athletic tasks, or a general decline in the horse's physical abilities.

Weakness is a frequently encountered issue, yet it is often not well-recognized or easily pinpointed. The leading cause of weakness typically stems from reflex inhibition triggered by discomfort in the soft tissues or musculoskeletal system. A horse with a painful back often has accompanying muscle hypertonicity of varying degrees, which alters the resting muscle tone and threshold for muscle activation. (K. Haussler, 2018).

It's crucial to underscore that the horse's physical condition should be the foremost consideration, taking into account factors such as its sporting activities, age, and the expectations of the owner. There is a possibility that the weakness reported by the client

may not necessarily be attributed to an issue with the horse itself but rather to inadequate training practices.

MOTOR CONTROL

Equine motor control refers to the ability of a horse to coordinate and control its movements and posture.

Even after the initial injury has fully recovered, there's a possibility that adaptive or secondary movement patterns can persist. These persistent patterns can make nearby joints and muscles more susceptible to injuries. This happens because the activation of proprioceptors (sensors for body position), nociceptors (pain receptors), and muscle spindle components sends sensory signals that directly and extensively affect various aspects of the peripheral and central nervous systems. These nervous system components play a direct role in controlling muscle tone and movement patterns. (K. Haussler, 2018).

The objectives of neuromuscular rehabilitation encompass several key aspects:

1. Identifying the particular muscles or groups of muscles that are implicated.
2. Diagnosing the root cause of muscle dysfunction, which may be related to neurological issues or muscular diseases.
3. Establishing the specific rehabilitation concerns pertinent to the horse's condition on a given day, such as timing or extent of the issue.
4. Formulating and executing a targeted rehabilitation strategy tailored to address the unique requirements of the individual patient.
5. Provide objective outcome measures to assess accomplishment of goals and eventual return to optimal function.

In these cases, manipulative therapies would be:

- **Three-Legged Stance:**
  The capacity to stand securely on three legs while lifting one leg off the ground is an evaluation of the musculoskeletal and nervous systems. This step-by-step elevation of limbs is employed to gauge how easily a limb can be raised and to appraise the proficiency of proprioception (sense of limb position) and the strength of the neuromuscular system (including core stability) in each specific limb. (K. Haussler, 2018).
- **Limb Circumduction:**
  Dynamic assessment involves introducing controlled circular movements in the distal (farther from the body) limb, akin to tracing a small circle about the size of a dinner plate. Horses experiencing perceived weakness, pain, or inadequate core stability in their upper limb muscles may struggle to balance on three legs, resist lifting or moving their limb in any direction, or exert excessive pressure on the evaluator's hands to avoid limb elevation.
  The use of limb circumduction exercises serves both diagnostic and therapeutic purposes. They help diagnose issues stemming from painful or diseased tissues

in the limb and also work to enhance strength and proprioceptive awareness, which is the sense of the limb's position in space.

- **Passive and Active-Assisted Limb Retraction:**
  If a sport horse encounters difficulty in extending its front and rear legs without experiencing pain, resistance, or balance problems, it can raise concerns related to flexibility and the horse's perception of pain or neuromuscular condition. To address this, a method called "active-assisted limb retraction" is employed both for diagnosis and therapy.
  In this approach, a handler gently guides the horse's forelimb backward, creating a slow and controlled stretch while requesting an "active stretch" from the horse. This technique is utilized in multiple repetitions as part of the treatment to aid in building strength and coordination in the specific limb or in the direction where the issue is observed.
- **Passive and Assisted Limb Protraction:**
  Passive limb protraction induces a stretch in the supporting structures located along the caudal aspect of the limb.
- **Sternal Elevation Reflex:** Horses experiencing discomfort due to poorly fitting saddles and pain around the wither area or dorsal spinous processes may find relief through exercises that involve lifting or flexing their trunk. These exercises encourage stretching and separation of the soft tissues and bony structures along the midline of the horse's back.
  One important diagnostic and therapeutic tool for addressing core stability issues in sport horses involves utilizing spinal reflexes. A specific spinal reflex, which results in the lifting of the chest region, can be triggered by applying upward fingertip pressure or gently scratching in a head-to-tail direction along the midline of the sternum. This action induces active elevation of the front part of the horse's thorax. In healthy horses, this induced motion should occur smoothly and easily, with the base of the withers rising about 2 centimeters.
  The ultimate goal of these exercises is to facilitate the development of core stability and movement at the scapulothoracic junction, which is the fibrous and muscular connection between the thoracic limb and the ribcage.
- **Pelvic Flexion Reflex:**
  Horses showing signs of lordosis (excessive arching of the back), noticeable pain or tension in the epaxial muscles (muscles along the spine), or stiffness in the trunk may benefit from exercises that encourage flexion in the pelvis and trunk.
  To achieve this, you can apply firm digital pressure on both sides of the intermuscular groove located between the biceps femoris and semitendinosus muscles at a point situated laterally to the base of the tail. This pressure triggers a natural response in the horse, resulting in the flexion and lifting of the pelvis (specifically at the lumbosacral joint) or a rounding of the entire thoracolumbar region (induced kyphosis). Once the horse actively raises its back and flexes its pelvis, you should maintain the finger contact to sustain abdominal muscle engagement and hold the stretch for up to 20 seconds.
- **Axial Tail Traction:**
  Applying controlled traction to the tail, either caudal (towards the tail) or axial (along the body's axis), can offer valuable insights for diagnosing and addressing

various aspects of a horse's performance, including their ability to coordinate the lower back and tail, execute canter movements, and stabilize their pelvis. This exercise is particularly beneficial for horses experiencing pain in their lumbosacral or sacroiliac regions, as well as those with challenges in coupling their hindquarters and generating forward propulsion.
To perform this exercise, exert a firm and controlled pull on the tail for approximately 5 seconds while observing the contraction of both middle gluteal muscles along the top of the pelvis. In therapeutic terms, if the horse exhibits a weak, slow, or limited response, gradually release the tail traction for about 2 seconds and then reapply it for 2 seconds. This cycle of applying traction and releasing it should be rhythmically repeated for up to 30 to 40 repetitions. Upon completing the exercise, gradually release the traction applied to the tail. (K. Haussler, 2018).

Contraindication:

Contraindications for joint mobilization and manipulation are often based on clinical judgment and are related to the technique applied and skill or experience of the practitioner. Few absolute contraindications exist for joint mobilization if techniques are applied appropriately. Manual therapy is not a “cure-all” for all joint or back problems and is generally contraindicated in the presence of fractures, acute inflammatory or infectious joint disease, osteomyelitis, joint ankylosis, bleeding disorders, progressive neurologic signs, and primary or metastatic tumors. (K. Haussler, 2016).

It is important for osteopath to thoroughly assess each horse's condition, consider the specific contraindications, and exercise clinical judgment before proceeding with joint mobilization and manipulation techniques.

Cases:

In research done by Brolinson, 2012, they concluded that: precompetition manipulative treatment was positively associated with improved performance among both offensive and defensive Virginia Tech football players. The results from this study provide preliminary findings regarding the potential benefit of precompetition manipulative treatment on Division I football players’ athletic performance.

C. Rao, 2021, explained that when used during a collegiate lacrosse season, this Osteopathic Primary Care Sports Medicine intervention did not significantly improve health outcomes. This preliminary study, did demonstrate improvement in overall team performance when comparing the intervention sport season to other seasons but was not statistically significantly. Therefore, further studies are warranted to improve the understanding in this approach to athlete health outcomes and performance.

In a private racing stable in Mexico, they compared two groups of racing horses (80 horses in total), where randomly they made two groups. Group A, 40 horses, were treated with manipulation manual therapy and Group B (control group), 40 horses, were not receiving any manual therapy. Both groups were having the same training and

feeding plan than before the study. After one month training, 82.5% of the horses in Group A improved their racing times, compared with the improvement of control group (30% of the Group B).

In an equine practice in Saudi Arabia, fifteen show jumping horses were selected for this study. Over a period of four months, these horses underwent various manipulative therapies conducted by trained professionals. All riders expressed satisfaction with the observed improvements in the movements of their horses following the manipulative therapies, from the first session, however the data about the impact on competition performance, were not available for analysis in this study.

Author experience:

In the author's personal experience, it is common for trainers and owners to turn to manipulative therapies after trying various treatments without success. Therefore, it is crucial to have knowledge of the horse's prior medical history and understand the limitations of manipulative therapies. Furthermore, understanding the limitations of manipulative therapies is important. While these therapies can be beneficial in many cases, they may not be a cure-all solution for every performance issue. It is essential to have realistic expectations and communicate this to trainers and owners. Approaching a case of poor performance should be done systematically, focusing the treatment on primary causes and addressing secondary factors in subsequent sessions if they persist.

Conclusion.

The goal of this thesis was to summarize and present how to address various situations in a horse with a decline in its athletic performance. It is of vital importance to recognize the origin of poor performance in horses. Once identified, it is crucial to tailor manipulative therapies to the individual and subsequently implement a comprehensive rehabilitation program. Further studies on horses are necessary to determine the extent to which manipulative therapies can enhance performance in sport horses.

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