# OSTEOPATHY AND THE EQUINE THORACIC SLING

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**INDEX**

## INTRODUCTION

### Equine Thoracic Sling – Core Stability System of the Equine Trunk

The horse is an amazing athlete able to move under human direction including at speed forward, backwards, sideways, jumping and landing, high school movements as well as be a sentient animal in everyday life.

The fact that a rider just by being mounted alters the centre of gravity and then moves it while riding and further moves the horse under their control shows how critical it is for the horse to have a strong, conditioned for the workload and fully functioning thoracic sling.

Structurally the horse differs from humans in being a quadruped and the reduction of digits and associated structures. One additional difference is the lack of a collar bone and all that is associate with this anatomical difference. The thoracic sling of the horse is how the forelimb of the horse is attached to the trunk as the horse has no collar bone and therefore no bony attachment of the thoracic limb to the axial skeleton. The thoracic sling is the core stability system of the trunk of the horse, the power then comes from the hind end, which directs the front of the body where the trunk is positioned.

Weakness in the thoracic sling will affect the whole horse as balance, movement, coordination and strength as all require a strong thoracic sling. That the thoracic sling sits over so many other critical structures show the far reaching effects of the dysfunction.

That dysfunction of the shoulder is rarely diagnosed in part due to the complexity of the area and hence the many different presentation

**Osteopathy – The Holistic Treatment of Matter in Motion.**

The part of osteopathy building on a holistic and full understanding of the horse structure allows techniques of manual therapy draw on finding dysfunction, fixing it or set in motion the animals self-healing power which may have been compromised. Manual techniques on the many tissue levels of the body are used taking into account the triune of mind, body and spirit – this centric approach acknowledges none act independently. This synergistic triad ultimately making the functional individual and that chronological and environment adaptation are considered and influence this. (Seffinger 2018, DiGiovanna et al 2005).

The philosophy of the whole-body mind and spirit and environment influence on the body ability to regulate and self-heal the multiply systems of the body, be that the respiratory, circulatory, neural, hormonal, digestive and musculoskeletal leads to the principles of osteopathy -nothing is stand alone. On from these five models of these interlinking systems - biomechanical, neurological, respiratory- circulatory, metabolic and behaviour help the osteopath to assess and treat the whole body. (Parsons and Marcer 2006)

The osteopath therefore considers the individual and their environment to allow optimal body function be this by removing or instigating removal of barriers and blockages.

With a better understanding of the structure and function of the thoracic sling and supporting structures, the osteopath holistic and considered approach is a more dynamic and useful approach to aiding optimal thoracic sling function for the discipline the horse is being asked to do.

With this knowledge we can best support the whole horse by osteopathy

**OSTEOPATHY**

**Osteopathy – what is it?**

The osteopathic lesion (somatic lesion/dysfunction) is what osteopaths find and

Osteopathy is what osteopaths do.

On from Andrew Taylor Still beginnings osteopathy has grown into a multifaceted holistic healthcare system. (Still 1899)

But what is osteopathy and how can this aid the body. To understand this an understanding of the osteopathic lesion and the philosophy of osteopathy is needed.

"The Osteopathic legion is a change is an impairment in its function or form of components of the body framework be it by asymmetry, range of motion, tissue texture – including temperature, sensitivity", (DeStefano 2017) leading to "potential respiratory, vascular, muscular, visceral, neurological dysfunction" (DiGiovanna et al 2005)

According to the *Glossary of Osteopathic Terminology the osteopathic legion the osteopath is searching for is* "An altered or impaired function of components of the somatic (body framework) system: skeletal, arthrodial, and myofascial structures and related vascular, lymphatic and neural elements."

The osteopath uses many different manual techniques to alter the body tissues so that health can be restored. They consider the mind body and spirit of the individual and the chronological influences and the environment they are in.

Think of it like making a cake. There are internal and external components that need to be correct. You need all the ingredient in the right amounts with the correct method performed in the correct order and then the right equipment to mix and cook set at the correct level.
It's an art and a science to bring all these components together in an understanding, chronological and optimal way to make the perfect cake. This art and science of osteopathy understanding and application aid healing and hence restore health.

This can be seen therefore as an individual centric treatment as no one individual may present with the same dis-ease or signs. The component that play into that disease state may be different (Seffinger 2018). With animals we often must rely of the human around that animal to describe the signs they are encountering with the horse to determine what is potentially not optimal. It may have many factors.

Osteopathy is a holistic approach to healthcare. The whole body is considered with its inherent ability to heal itself. The whole is known as the triune – of the mind body and spirit of the individual along with considering the environment and the chronological adaptations the body has faced mentally and physically in their lifetime. (Chaitlow 1982).
Clinical presentation may be chronic and long standing or recent and acute but this needs to be considered when working with an osteopathic approach.

The osteopathic principles have to be considered – (DiGiovanna et al 2005) there are main principles and the silent principle of osteopathy.

**Body is a unit** – all structures are integrated, and one structures dysfunction will affect the rest of the body treating the whole person that includes the physical, social, psychological and spiritual is the ideal.

The division of the body into functional units is to help with human understanding but none of this division works independently. Circulation, glandular and neurological components etc play a part in every process. All work together to benefit the total. (Destefano 2017)

**Structure and function are interrelated** so the structure allows the function, and the function can modify the structure.

**The body possess self-regulatory mechanism** and the **inherent capacity to defend and repair**- the body is constantly monitoring itself and the environment and able to act to bring the body back to homeostasis, it has an allostatic response to if away from the normal range. This often can be from external challenges.

**Lastly the - The unwritten principle is the artery is king** – this implies that the fluid flow of the body allows for the regulation and healing to take place, be that circulatory, hormonal, CSF and digestive fluids. All this is under control of the neurological system.

Ultimately the body to act optimally needs to be in homeostasis. This can only happen if all components are within range and homeostasis is able to act, sometime an allostatic status occurs when out of a normal range and the body will need further adjustment. If this allostatic overload has occurred the compensatory and extreme dysfunction that cannot heal occurs and

the osteopath at this point must help reset and perhaps even work several layers or systems away to help realign the healing process.

Movement of body fluid is key and a key controller of this is the nervous system. So here we see how the beginnings of the holistic and dynamic systems of the body come into play. Osteopathy therefore evaluates the soma, ultimately the musculoskeletal system and along with history, environment factors and clinical signs (symptoms) develops a hypothesis of dysfunction and contributing factors. To help hypothesis and understand this dysfunction all data is important even if it seems unrelated.

The salutogenic approach of five models interacting to aid health and regenerative wellbeing is employed. (Parsons and Marcer 2006). **Figure 1** shows the models and their interactions. These models are

**Biomechanical model –** the musculoskeletal system- the primary area the osteopath can work on, are all component working optimally are the strengthened and mobile enough for the actions being asked.

**Respiratory/ circulatory model** – the delivery of nutrients, oxygen and removal cellular waste products from all parts of the body. Is this working optimal to provide the building block of cell respiration and waste removal.

**Neurological model–** facilitation and normal action of the autonomic and peripheral nervous system – are nerves being compromised, are stressors on the body too high

**Biophysocial model** – the environmental and psychological stressors on the body are considered – is the stressors of the life not allowing the body to heal – is the body in flight or fight to much of the time and not in the rest and digest?

**Bioenergetic model** – energy production expenditure and distribution maintenance. Is enough energy going into the system to heal, is the right energy and nutrients going in? Is too much energy being used up for none healing processes.

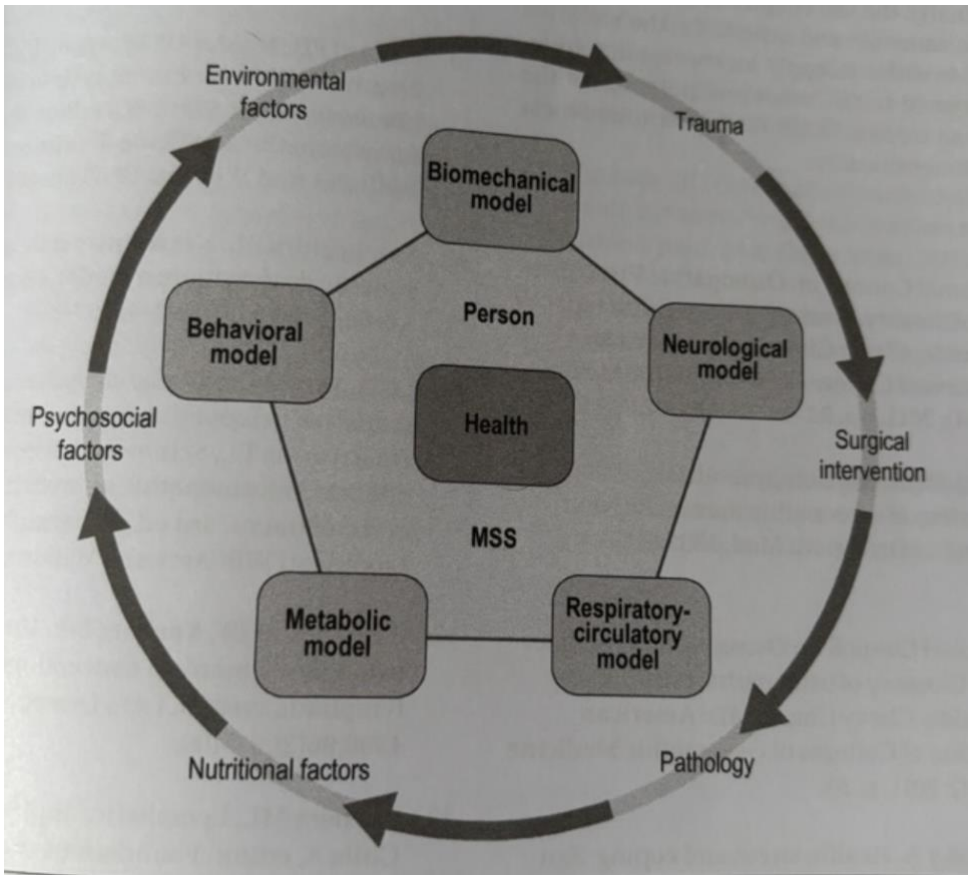


**Figure 1** The five osteopathic models (Hruby et al 2015)

The osteopath therefore considers many factors and their influence on the individual so addressing optimal body function be this by removing or instigating removal of barriers and blockages and supporting the innate ability of self-healing and repair.

## THORACIC SLING

### Anatomy and Function of the Thoracic Sling

The difference between horses and humans is the lack of bony attachment the clavicle between the thoracic limb and the trunk/thoracic cavity of the horse, this means that the thoracic limb of the horse is only attached by soft tissue- ligaments, muscles, tendons and fascia to the axial skeleton. This gives the horses shoulder greater range of movement (Dyce et al 2017)

The horse's thoracic limb is attached to the rest of the body by muscles, ligaments tendons and fascia (**Figure 2**). This soft tissue holds the forebody and neck of the horse up by supporting the thoracic cavity between the front legs. (Williams 2014)

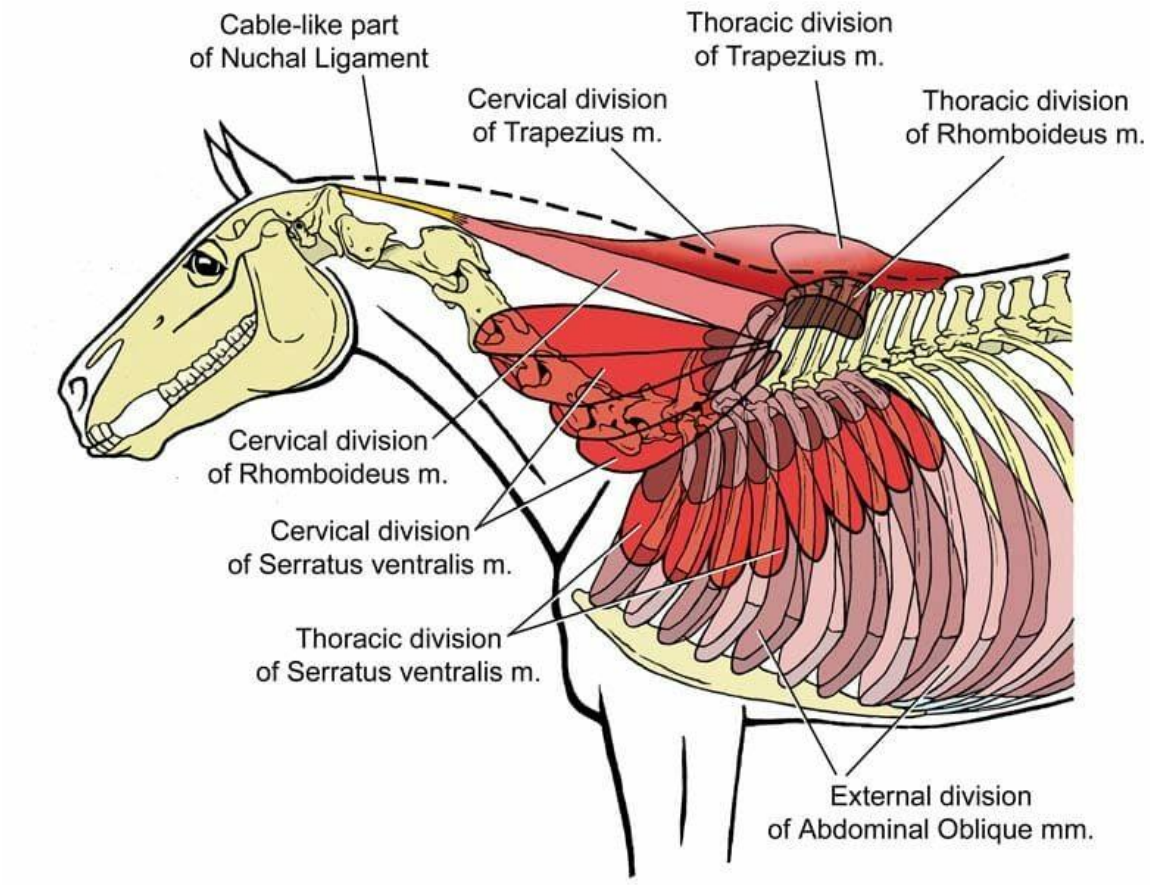


**Figure 2** The Thoracic Musculature( Hagan 2023, Bennett 2020)

This thoracic sling plays a critical control in movement, balance, coordination and strength. Weakness in the thoracic sling will affect the whole body of the horse. effecting, gait quality – stride length and coordination, stability, add a rider and you add to the imbalances. (Back and Clayton 2001). It also has a role when a front foot is lifted as the supporting leg and attachments to the axial skeleton must carry the unsupported side of the thoracic sling.

The thoracic sling needs strong muscles to suspend the ribcage between the scapular. These muscles are needed to work together to support the axial skeleton so the forelimbs can function freely and optimally (**Figure 3**)

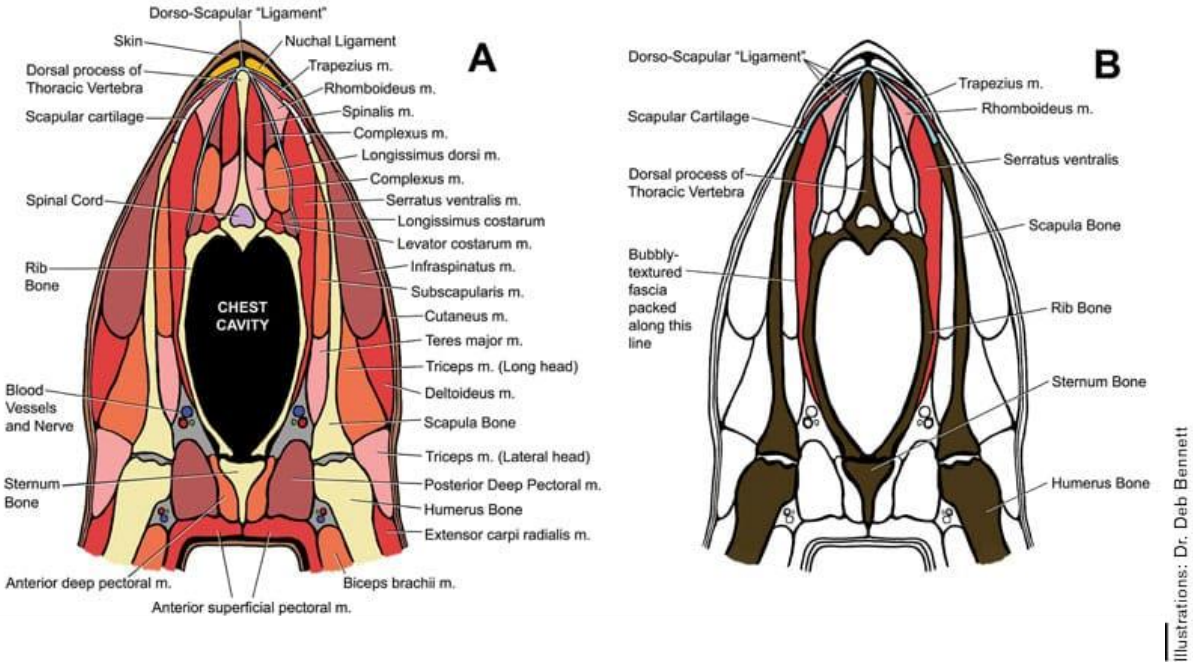


**Figure 3** Cross Section of Equine Thorax at the wither level.(Hagan 2023, Bennett 2020)

A - muscles are in red and orange, loose connective tissue is gray, bones are yellow, nuchal ligament is gold, scapular cartilages are green, dorsal scapular ligament (DSL) is in blue.
B - with bones in dark brown, and only those muscles that attach to the DSL are coloured. Note how the forelimbs hang off the DSL.

The thoracic sling is made up of the following.

- Dorsal scapular ligament (DSL) attaching spinus processes of T3-7 to the dorsal border of the scapulae cartilage.

- Serratus ventralis - This axial -scapular connection is further enhanced by serratus ventralis (part of which is an enlarged version of the human levator scapular.)- it has a high level of aponeurotic material which is fatigue resistant as it lifts and holds the ribcage up through the scapula.

- Deep pectorals – Ascending- reaching back to the fourth rib and the Subclavius - which extends up to the dorsal angle of the scapulae. These along with the serratus ventralis therefore support the dorsal aspect of the ribcage.

Associated with this are

- Superficial pectoral - descending and transvers support the ventral aspect of the ribcage Superficial pectorals hold the body together otherwise the legs would be pushed apart. They also have an ipsilateral support role to the opposite leg when lifted

- Rhomboids and Trapezius with DSL fix the scapular to the spine so the deep pectoral and serratus can lift and hold the rib cage.

- Brachiocephalicus, omotransversarius both have attachment on the humerus and in so doing support the weight of the neck and head and trunk on the front legs so indirectly supporting the thoracic sling.

- Latissimus dorsi attached onto the humerus and is strongly associated with the tensor fasciae antibrachii – part of forelimb stay apparatus.

Harrison et al (2012) reported that during ground contact the proximal muscles coordinates to the position and stabilise the joints of the shoulder and elbow. Energy storage and shook absorption is achieved within the thoracic sling and specifically the musculotendinous units (Hagen 2023).

The thoracic sling is a complex support system. (Budras et al 2011, Williams 2023) Ultimately everything is connected to everything, and this is what the osteopath considers. Its multiple roles as described above along with the support for the forelimb reciprocal system, anchorage and coordination, and balance of the horse cannot be over emphasised

**Thoracic Sling Dysfunction**

If it is not working optimally cannot be highlighted more in the need for the dressage horse to show **self**-carriage, the jumper needs a supporting thoracic sling to allow power from the hindlimbs and the  psoas and abdominal musculature to have an effective lift off. Compensation onto brachiocephalic and erector spinae will then result in trying to lift the horse over. The horse will lower the back, lift the head and rider will have to hold horse so creating many compensation issues. The landing from the jump needs a strong thoracic sling or the trunk will sink through the front legs. Serratus ventralis is critical when landing from a jump or drop to allow the controlled drop of the thorax. The landing over a jump is taken unevenly one forelimb slightly before the other and the thoracic sling must support this (Dyson and Palmer 2023).

Type 1 and 2 osteopathy dysfunction discussed in the course have components of the thoracic sling. For Type 1 there will be interference of the bend or stretch at the junction of the change in the bend so effecting bend or stretch laterally of the musculature. With Type 2 the trapezius directly but also the caudal cervical region of the neck is implied from the thoracic sling dysfunction.

Saddle fit will have potential to affect the structure and function of the thoracic sling. Effecting trapezius, serratus and rhomboids will affect how the thoracic sling can operate. Horses need to raise their heads to allow their binocular vision to judge distances hence a fully functional thoracic sling is needed in any discipline where the horse needs to judge distance. (Furr and Reed 2015)

Asymmetries of the thoracic sling will lead to saddle issues, rider asymmetry, potentially lower limb issues and shoeing irregularities. And potentially vice versa. This obviously will effect all joints between the foot and the thorax. Resistance to bending one way, difficulty in canter, laterality, easily fatigues, difficulty lifting feet, falling out, difficulty in lateral work may all be indications of issue primarily or secondarily from the thoracic sling. (Brooks and Pusey 2006) it was found Sternal lift compliance and ability performed are dependent on the position of the head (Landskron et al 2023). The position and stability of the neck and head is dependent on the thoracic sling.

The thoracic sling will be challenged with footing and surfaces, camber on roads, mounting, leading and farrier work, equipment fit, rug fit the list is extensive, in fact every step your horse takes challenges this amazing structure.

All the muscles of the thoracic sling attach to the rib cage and therefore can affect breathing, when working hard the muscle will potentially effect breathing and also physical and emotional issues. The horse 'holds emotions in the shoulders'. – with sympathetic and parasympathetic nerves run through the thoracic cavity. Metabolic stress throughout the body and mitochondrial ill health will result from lack of effective breathing. (Gintis2007, Grisel 2018)

Under and at the front of the rib cage is the thoracic outlet/inlet one of the diaphragms of the body. In human's thoracic outlet syndrome symptoms include numb, tingling and lack of function of the thoracic limb. Passing throughthis diaphragm is neuro, digestive and vascular structures including the vagus and phrenic nerve (Henderson et al 2024, Walton 2024). Either side of the spinal column running from the late cervical and early thoracic vertebrae is the

brachio plexus and subclavian vessels therefore tension and dysfunction of the thoracic sling can influence, biomechanical, respiratory, circulatory, neurological, digestive (metabolic) models. It can easily be deduced that this then may well effects the behaviour of the individual.

Many of these muscles, tendon attachments and bones have links into the myofascial lines (Schultz 2021 et al , Walton 2024) directly the spiral line, functional line, lateral line, deep and superficial ventral line and obviously the front limb lines of protraction, retraction, abduction and adduction. Note the difference of biped to quadruped and the lack of collar bone means the abduction and adduction lines differ to the human.
Front Limb Adduction Line (FADL) and the Front Limb Abduction Line (FABL) in the horse act as slings in the brachial and antebrachial regions. The FABL includes structures for abduction and internal rotation connecting to the Front Limb Retraction Line (FLRL), and the FADL structures of adduction and external rotation near the Front Limb Protraction Line (FLPL). The front limb lines support the movement of the front limb around the "thoraco-scapula pivot joint" – which is positioned within the thoracic sling dorsal scapular ligaments medially at the level of the upper third of the scapula.

Indirectly from the connections to the nuchal ligament and muscles of the neck and back the last two lines at present known, the deep and superficial dorsal line can be included in the effects of the thoracic sling (Elbrønd and Schultz 2021).

So actually "everything is ultimately joined to everything" – these fits well into the philosophy of osteopathy being holistic and can be treated in a maximalist or minimalist way in it dealing with the body. The symptom-based approach of western medicine is useful in

acute and subacute simple presentations as it looks at reducing pain, symptoms and is local or regional in treatment unloading pain sensitive structure. This is a fire fighting instant response to the clinical presentation.

Minimalist osteopathic consideration is better placed with sub-acute or chronic and can be more complicated with a mild to moderate allostatic load. So it finds the clinically significant dysfunctions and processes with a global osteopathic technique approach (GOT) or articular osteopathic balancing (AOB) with animals.
The maximalist approach where often the osteopath is brought into help are the chronic, chaotic and complex cases with high allostatic loads (lots of compensations). The osteopath is looking intensive whole-body treatment to support the physiological process with emphasis on the autonomic nervous system and the respiratory and circulatory dynamics that have altered. Whole body approaches are needed to reduce overall allostatic load so kick starting healing (Fossum 2017).

The thoracic sling dysfunction fits well into the maximalist osteopathic approach, includes the functional and structural - be that neurological, visceral, respiratory, circulatory, hormonal, digestive and metabolic and body cavity pressure differences as well as the more obvious musculoskeletal structure.

From. Personal communication with the vet and acupuncturist with traditional Chinese medicine understanding (TCM) Lindsay Brazil a link between these fascial lines and the meridians of acupuncture are observed and the influence of one part of the body being treated to aid another perhaps seemingly unrelated part is acknowledged.

Dysfunction of the shoulder is rarely diagnosed due to low incidence or ability to distinguish it as an issue. It would present as a potential 50/50 weight bearing, non weightbearing according to lameness book – of protraction or retraction. (Ridgeway 2006, Grisel 2018)

The concludes that the thoracic sling dysfunction may be over looked often at present within the equine performance.

## DISCUSSION AND CONCLUSION

The horse is a marvel of evolutionary specialisation, and the thoracic sling has contributed to the efficiency, complexity and ability of movements the horse can perform.
A dysfunctional thoracic sling has been discussed above and shown to effect all body systems and osteopathic models.

That the thoracic sling can affect and be effective by so many other parts of the body emphasises its importance. There is no mention of the shoulders in the ridden horse pain ethogram, but head position is mentioned extensively (Dyson 2022). Landskron et al (2023) show that head position effects thoracic sling engagement when performing sternal lifts and hence core stability. The link between pain and thoracic dysfunction may be under appreciated.

A dysfunctional thoracic sling is not easy to quantify but qualitatively a huge change will be obtained from osteopathic techniques such as Osteopathic Articular Balance (AOB), Functional Techniques, Positional Release and Recoil, Myofascial Release and Cranial Sacral Techniques  so reducing pain, improving tissue texture and energetic efficiency.

That osteopathy considers the whole individual and it systematic approach of manual therapy allows the thoracic sling to be the focus and also the exteriority of treatment, this approach is highly beneficial to the horses ability to heal and repair this complex area.

The thoracic sling is critical to every step your horse takes and it needs and deserves a more considered acknowledgement.

“The dance of movement” (Gintis 2007) is a wonderful phase to keep in mind when interacting with horses. It is a dance undertaken in partnership – in whatever discipline.

To enable each step to be flowing, free and fluid the osteopath must ensure that both partners mind body and spirit is optimal.

Ends

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