



# Classical Horse Training

*Combining art with science to achieve balance and harmony*



## LATERAL BENDING

*'An essential element to achieve straightness'*

# *MANUAL*

## **Foreword**

This document is the result of many years of research and personal experience world-wide. I sincerely hope that it will be useful to your personal learning experience and contribute to your personal training and development. This document goes together with the video assigned to you in the Online Support Program. Make sure to first watch the video and use the manual as an additional learning tool. I wish you a lot of fun and lightbulb moments diving into these materials.

## **Copyrights**

Please take note that the content of this manual is copyrighted by Thirza Hendriks. It is strictly forbidden to change or publish this document online or distribute to third parties without the explicit written consent of Thirza Hendriks herself.

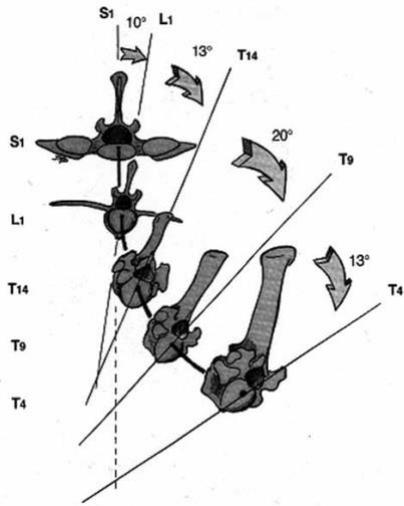
## **Disclaimer**

This document has been compiled with great care to ensure the accuracy of the information. This document is part of Classical Horse Training Online Support Program. The content is therefore incomplete without the accompanying video. Thirza Hendriks cannot be held responsible for incorrect information in this document or any damage caused by incorrect use of this information. This document does not replace veterinary diagnosis and no definite medical conclusions can be drawn from this document.

## **INTRODUCTION**

Lateral bending prepares the horse's body and mind to coordinate movement in such a way that it can carry a rider and itself with minimal effort and most efficiency. Correct lateral bending is an absolute basic as it is needed when turning corners, riding circles and all lateral movements.

The term lateral bending refers to the illusion of equal bending from head to tail in the same direction of travel. Equal bending is an illusion as certain parts of the spine allow for different ranges of motion. Hence, the spine cannot bend evenly throughout. Lateral bending can best be considered as the ability to bend with the arc of a circle in both directions. By doing so, the inside shoulder and inside hip come closer together. This means that in a correct lateral bend the shape of the horse is concave to the inside and convex to the outside.



Lateral bending is one of the three natural movements that occur in the horse's spine. It is critical to remember that in the cervical and thoracic spine lateral bending is always coupled with axial rotation and vice versa. This means that with a correct lateral bend, the spinous processes bend in the concavity.

The opposite of this is called inverted rotation in which the spinous processes are pushed towards the outside – the convexity – of the bend. This position puts a lot of stress on vertebral structures and asymmetry in musculature.

*Above: Picture Adapted from Denoix (1999). He was the first to publish a comprehensive study showing that LB and AR combine.*

Furthermore, it affects the rider's body in a negative way. Inverted rotation is often associated with the exercise of haunches-in and due to the limitations in the spine the horses can only bend so far.



*To the left: correct lateral bending coupled with proper axial rotation. To the right: inverted rotation. Pictures are copyrighted by Classical Horse Training.*

Üdo Burger (1959) was an accomplished horseman who spoke about the phenomenon of inverted rotation stating that:

*“Some reputedly incorrigible horses, that one rider after another has vainly tried to manage will have learned to twist themselves in a perpetual ‘S’ shape which has enabled them to evade all controls that their riders could think of. Although they willingly turn their head and neck right when the rider pulls on the right rein, in doing so they turn their hindquarters the other way.”*

Inverted rotation is thus a root cause of many problems and should always be addressed and cured through proper couple of axial rotation and lateral bending.

Bending can be asked both on the ground and ridden in all gaits. However, due to the natural rigidity of the trot, range of motion for lateral bending and axial rotation is most limited and should therefore be carefully applied in this gait.

Lateral bending is often associated with lateral movements and circles. Since all lateral movements will be dealt with in separate manuals, I will mainly focus on the voltes and turns in this manual.

## HISTORY

Within classical dressage, a volte is defined more or less as the smallest circle a horse can accommodate with his lateral bend. The use of voltes have been employed since the early age of dressage. From a historical perspective there were two types of circles – or voltes:

1. Those in use for the exercise of war
2. Those practiced for pleasure in school

From a military perspective, the voltes were first invented to make horses more expert in combats with the sword or pistol. The horse was required to be obedient and swift on the circle, ready to turn upon their croup briskly. This way, soldier might gain the croup of his enemy, or prevent his enemy from gaining his own croup by always facing him. The circle was thus performed on one circular tread, only half haunch-in so that the horse may be firmer behind. As the arms were traditionally held in the right hand, a war horse had to be very supple to the right with lesser attention of voltes to the left and would thus create asymmetries in the horse's body.



a right lead 'military' volte.

Later on the volte became an exercise performed in school or academies, in which the haunches were more closely confined. The exercise was performed not on one, but upon two treads – either on a square or round volte. De La Guérinière referred to this as “*embracing the voltes*”.

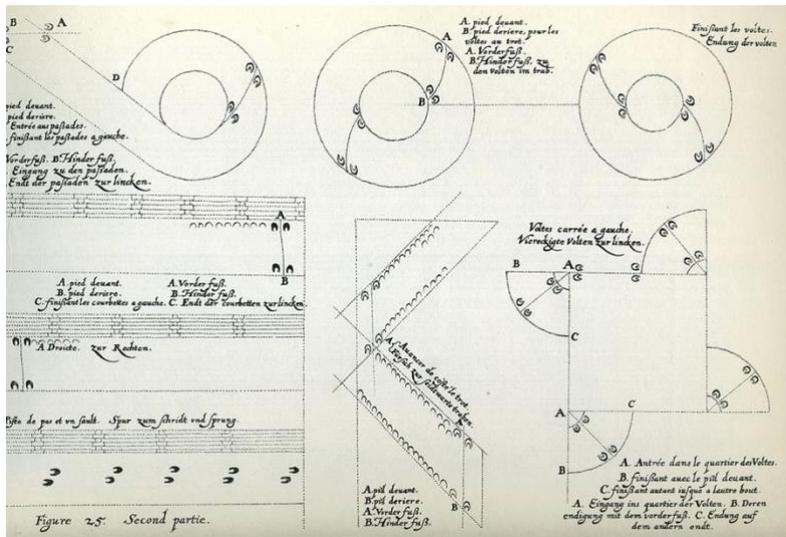
It is not exactly known who invented it, but the Portuguese author Carlos Manuel de Andrade (1790) credits the Italian master **Giambattista Pignatella** (+/- 1525-1600) for discovering the gymnastic value of riding circles on a single track. Unfortunately, Pignatelli didn't write a book. However, luckily his talented student **Antoine de Pluvinel** (1555-1620) - commonly recognized as one of the greatest horsemen of all time - did. De Pluvinel described the volte as: “*the most important movement a good horse can do, because therein lies more science than in any of the others.*” However, he also continued to state that it was the most difficult one to perform for the horse, arguing that: “*When we observe young horses moving we can sometimes see them in the nicest of collected gaits and high school jumps in the air up to and including the capriole. We can even observe them performing a demi or quarter volte, but never a FULL volte.*”

In order to supple the horse effectively, Pluvinel started the education of a horse by the means of the single pillar. The single pillar marked the centre of the turn on the forehand in movement and the passade. In order for these exercises to be effective, the horse had to execute two round circles with the shoulders and its haunches, while its spine had to remain parallel to the radius of the circles. The turn on the forehand can be seen as the gymnastic precursor or the shoulder-in on the circle as it requires the shoulders to travel on a smaller circle than the haunches. This requires the hind limbs to step over – especially the inside

hind limb – sideways and take bigger steps than the front limbs. Consequently, the exercise supple the hip joints of the horse.

The opposite is the *passade*, which can be described as a turn on the haunches in movement. In the *passade*, the haunches are closer to the centre of the circles than the shoulder. As a result, this exercise supple predominantly the shoulders and shows close kinship to the *huanches-in*, *renvers*, half pass and *pirouette*.

In both versions of a circle, la Pluvinel emphasized a great deal on the importance of the sideways movement: *“If the horse does not want to obediently go sideways, it cannot move on a good volte”*.



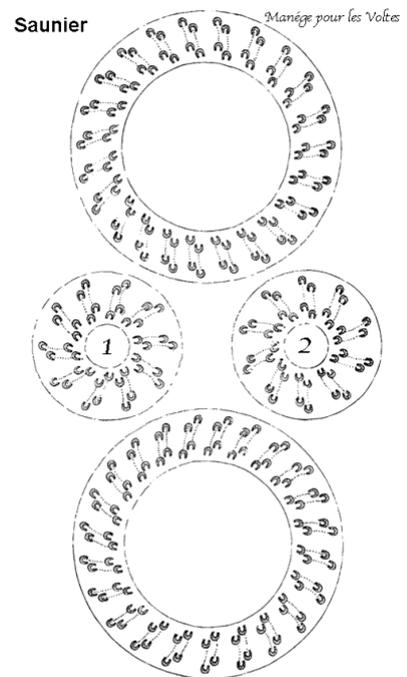
Pluvinel was not the only successful student of Pignatelli, but shared this legacy with **Salomon de La Broue**<sup>1</sup> (1530-1610). He developed the horse’s training by breaking up the figures in simple elements and using the square volte imagined by Pignatelli which would later on inspire Francois Robinchon de La Guérinière.

A drawing of Salomon de La Broue on round and square voltes

<sup>1</sup> It must be said that Where Pluvinel was considered as an advocate for kind and fair horsemanship, de La Broue was known to force obedience more through force as applied by Frederico Grisone (1507-1570) whom educated Pignatella [whom in turn educated De La Broue].

The volte as an exercise were further developed by the **William Cavendish – The Duke of Newcastle** (1592-1676) – and **Gaspard de Saunier** (1633-1746). The two were known to train with each other. The Duke of Newcastle furthered the concept of shoulder-in on the circle and de Saunier left us beautiful images of his work on what he called ‘*Manège pour les Voltes*’ which can be seen to the left.

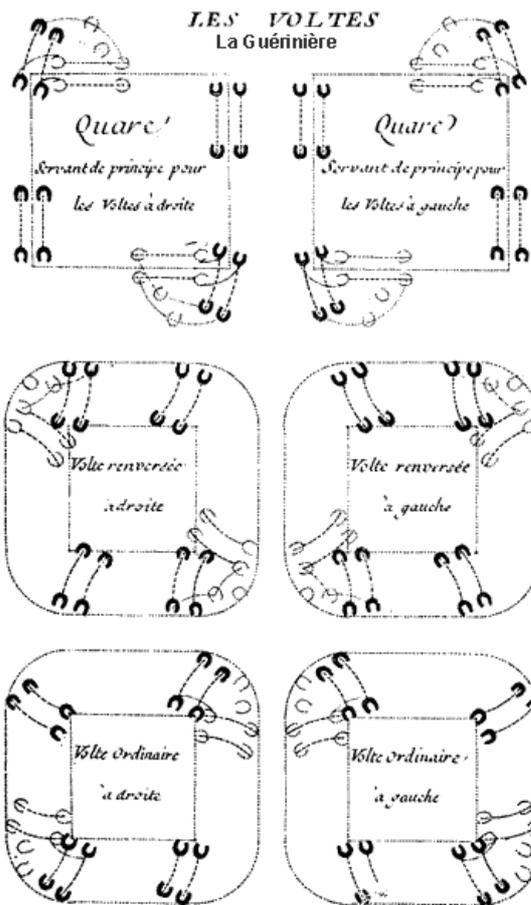
However, although the voltes had proven to be very useful, some limitations were also recognized. The Duke of Newcastle acknowledges the inconvenience of the circle – although it was his favourite lesson – when he says that in the circle with *“the head to the centre and the croup out, the fore-parts are more confined and constrained than the hind parts, and that it puts the horse upon his shoulders”*.



It is this discovery that led French classical master **Francois Robinchon de La Guérinière** (1688-1751) to the invention of shoulder-in on the straight line as the ultimate exercise to induce correct lateral bending. He wrote: *“This acknowledgement – \*referring to the Duke of Newcastle’s own statement\* – which is confirmed by experience, proves clearly that the circle is not the true means to supple the shoulders perfectly, because any part that is constrained and loaded by its own weight cannot become light; and besides it is very true as this illustrious author – \*referring to the Duke of Newcastle again\* – admits, that the shoulder cannot be made supple unless the inner hind leg be kept near to, and advanced before, the outer hind leg, in the action of the walk. It was this judicious remark that let me upon inventing this lesson of the shoulder-in”*.

Apart from the shoulder-in, he also wrote a great deal on the renvers – as opposed to the haunches-in of which was not a great fan\*. Inspired by the de La Broue, he went on to develop the square volte through using the lateral exercises. This requires even more flexibility and suppleness of the horse. He distinguished between two type of voltes:

- Reversed volte
- Ordinary volte



Guérinière preferred the more difficult reversed volte – in fact he often taught this one first stating: *“as soon as the horse obeys, and goes readily in the lesson of volt reversed, he may be put to the ordinary volt”*. The reversed volt is derived from the exercise renvers [croup to the wall] in which the forehand moves on the sides of the square, the hindquarters travelling on an outside track parallel to the sides of the square and in the corners, the forelegs move in place while the croup describes a quarter of a circle on the outside.

Guérinière explained the difficulty of the reversed as following: *“in volts reversed, the outer legs ought to pass and step over the inners, as in croup to the wall, and this is much more difficult to perform, because he is more collected and upon his haunches than in an ordinary volte.*

After the ordinary volte Guérinière went on to the ordinary volt in which the horse is kept *“with his croup to the centre, and his head and shoulders opposite the wall, at about three feet distance from it”* so the horse moved with the hindquarters on the sides of the squares so that the forehand moved on parallel tracks outside of the square. In the corners, the hind legs moved in place so that the shoulders described a quarter of a circle. Guérinière described this as ‘embracing the volte’.

The reverse voltes are hardly practised in modern day dressage as they are quite difficult. However, they have great valuable and I would always recommend to implement them in your training once your horse has been educated in the utter basics correctly.

The use of lateral movement to supple and straighten the horse appealed greatly to German master **Gustav Steinbrecht (1808-1885)**. Inspired by De La Guérinière, Steinbrecht observed that the only way for the horse to move the shoulders toward the inside while maintain the haunches perfectly straight, was to bend the thoracic spine laterally. He presented this idea in a concept he named the ‘shoulder-fore’ which basically precedes the shoulder-in.

The growing emphasis on lateral work, especially the shoulder-in showed a geniality all these classical masters had in common: they discovered the fact that axial rotation – placing the horse’s shoulders towards the inside – induces lateral bending. None of these classical

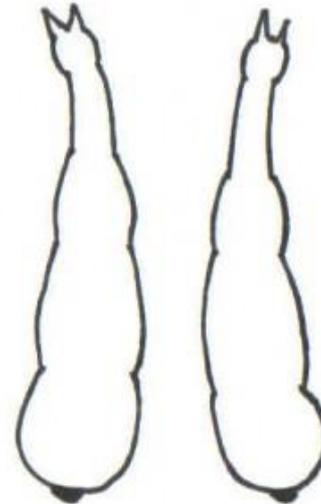
authors ever mentioned the combined existence of axial rotation and lateral bending simply because scientific knowledge was not available at that time. However, they all started to realize that [endless] circles were a useful, but not the only tool to supple the horse's shoulders and induce correct lateral bending and counteract inverted rotation.

At later times, Portuguese Master **Nuno di Olivera (1925-1989)** confirmed this line of thinking by stating that *"The shoulder-in is the aspirin of horse riding that cures everything"*. He was known to start regular training with a few minutes of trot after which he immediately started with the shoulder-in – especially on the straight lines but also on the volte.

In summary, it can thus be said, that the essence of all lateral movements is correct lateral bend. Throughout history, the classical masters have proven themselves to be real geniuses in discovering the coupling of axial rotation with lateral bend to supple the horse correctly. The voltes – whether square or round – are a great tool that can be used to supple the horse. Although they are very useful, their level of difficulty and limitations should also be recognized. It is thus advised to use the voltes wisely with enough interaction – with other exercises - and variation – round versus square – in order to serve their beneficial purpose. Remember that circles are the hardest exercise to perform and thus never overdo it and always come back to straight lines.

## LATERAL ASSYMETRY

All horses have a lateral asymmetry to some extent. A left bended horse has a natural bending of the spine to the left. It will easily overbend to this side and finds harder to bend to the right. The muscles on the concave side are stiffer, while the muscles on the convex side are suppler. The opposite is usually true for right bended horses.



This lateral asymmetry causes problems when trying to move on a straight line and in turns.

When a horse does not bend to one side it will become imbalanced and 'collapse' through the turn and therefore lose vertical balance in which case the horse is forced to either increase or slow its pace, interfering with the natural capabilities of both limbs with all consequences thereof.

Possible ignorance and asymmetries of the riders body often worsens the imbalance. Therefore, it is your task to improve your own posture first so that you can guide the horse to gain the ability for a proper lateral bend to both sides, which will ultimately contribute to general straightness and carrying power in the hindlimbs, and thus balance and lightness.

The lateral asymmetry was a common knowledge with several classical masters including **Gustave Steinbrecht**, who stated that:

*"It is a generally known fact that green horses have more difficulties on one side than on the other and that most horses initially have these difficulties on the right rein.*

*To discover the actual reason for this phenomenon is more the task of a researcher in natural sciences than of the practical horse trainer. It doesn't matter to the horse trainer whether it is related to the fetus lying in the womb or because the groom approached him mostly on the left. In both cases, he can do nothing about it.*

Now, there is reason to discuss whether most horses are still left-bended as there are many modern-day finding who prove the contrary but that is not the point. Instead, Steinbrecht goes on to say:

*"I want to mention this phenomenon only to warn against the mistake which often arises: the predominant working of one side while neglecting the other. It is indeed advisable to bend the stiff side more frequently by practicing the appropriate exercises a greater number of times."*

The most important take away message is thus that you – as a trainer – should be aware of your horse’s lateral asymmetry and always train more on the difficult side compared to the easier side.

## PREPARATION

Lateral bending is not so much of a separate exercise, but more of a shape needed to perform turns, circles and lateral movements. It is preceded by the opening of the jaw through correct lateral flexion - stelling. A horse can have stelling without bending, but not bending without stelling. Therefore, the opening of the jaw has to be confirmed prior to asking for lateral bend.

The horse should be familiar with the aids for vertical balance on the square to adjust the shoulders if necessary.

Furthermore, lateral bend is naturally induced through a Shoulder-in position and a Renvers.



It is very important that you have a clear inner picture and master your own posture appropriately to set your horse up for success.

## STEP-BY-STEP PROCESS

The basic aids include inner intention, body posture, voice, rein and whip aids.

### GROUNDWORK – ONE REIN (CAVESSON)

1. Start on either a straight line or a square and confirm the vertical rebalancing aids on the shoulder. Having a strong inner picture in your mind in which imagine being a pillar in which the horse should softly fold/move around without bumping its shoulders.
2. Ask for lateral flexion of the jaw – stelling. A well-trained horse will be able to give the stelling on its own. If the horse is not capable of this yet, then assist by asking with the inside rein. Make sure not to overbend the neck , as this will make your

horse fall over its outside shoulder, making it impossible for him to bend properly.

3. From there, you can choose two options:
  - Place the horse's shoulders inwards – shoulder-in idea – and from there take it with you to a regular circle with inside bend.
  - Place the haunches to the wall – Renvers idea – and from there take the horse with you to a reversed circle using counterbend
  - Move on the square and gradually round off the corners in which you keep tracking of all four feet and the nose following the same direction

4. Make sure to keep your own line of direction, as it is common to walk with your horse when he is falling through the inside or outside shoulders. This way, your following your horse instead of leading it properly.

5. The shoulders have to turn and lead.

- If the horse falls over the outside shoulder: you can make a half halt in rhythm of the outside front limb to bring it in. Be careful to not limit the outside front limb too much as this leg has to make the biggest turn. Therefore, Immediately yield when the horse follow. When it proves difficult to take the shoulders with you, you can use a whip aid on the outside shoulder to correct it.



- If the horse falls in to the inside, rebalance vertically in the rhythm of the inside front limb or ask a few strides counterbend if needed.

6. Assist on the girth area where normally your inside leg would be if needed. However, be careful that the horse is not pushed over to the outside shoulder as a result.

7. Enjoy the process and don't tire the horse too much 😊

### **WORK IN HAND & LONG-REIGNING – TWO REINS (CAVESSON OR BRIDLE)**

1. Follow the same process as described under groundwork, but instead use the outside rein to control the outside front limb and. It is easiest to keep your whip in the outside rein hand. Always make sure that the outside rein doesn't slip to far

forward on your horse's neck.

2. Time your half-halts in the rhythm of the outside front limb and immediately give forwards when the horse responds. When the outside rein is too limiting, the limb will be restricted to turn.
3. Be soft and giving in the inside rein. Remember, this rein is only there for lateral flexion. If the horse falls through the inside shoulder, never use a direct inside rein against the horse's neck to ask the horse to move off this shoulder but rebalance vertically with the outside rein instead.
4. Make sure that the independent quality of one rein aid doesn't cause to lose quality of the other. Quality once established must remain. For example, once the lateral flexion has been established using the inside, it should not be lost when you apply an outside rein aid.
5. When giving a whip aid on the girth area, make sure not to accidentally pull on the outside rein.
6. Enjoy the process and don't tire the horse too much 😊



### **RIDING – TWO REINS & SEAT (CAVESSON OR BRIDLE)**

Naturally, when performed ridden, the aids of the seat and legs are added to those of intention, body posture, voice, reins and whip.

1. The essence of anything performed ridden is to remain in a soft neutral seat in which you stay vertical over your seat bones and don't disturb your horse's movement. Remember that any shifts in your weight will prefer one side of the back muscles over the other, causing either the thoracic or lumbar spine to stiffen.



2. Follow first and produce later. Start to feel and follow your horse's left-right swing and reduce – not stiffen - your range of motion to match that of your horse.
3. If your horse is vertically imbalanced, it is impossible to sit 'straight' and remain vertical over the seat bones as the horse simply pushes you off. If this happens, rebalance the horse first vertically before asking any lateral bend.
4. If your horse is horizontally imbalanced, try to produce a bit more of a light seat in which you follow the horse's center of gravity. You can use your leg aids in the rhythm of the hind limbs to encourage the horse to step under further.
5. Use the reins the same way according to the descriptions in work in hand in which you use the inside rein only for lateral flexion and the outside rein to control the outside shoulder and thus the bend. Remember, what you feel in your hands is information about the horse's body and mind.
6. You can invite the horse for correct lateral bend using your pelvis and thighs. Remember, lateral bending happens mostly between the 9<sup>th</sup>-14<sup>th</sup> thoracic vertebrae which is exactly the area covered by your seat. You can align your seat by turning your body inwards to the direction of bend wanted. By doing so, your outside thigh should make contact with your horse's ribcage. You can slightly use small pressure to make your intentions clear to your horse. Your pelvis and shoulder should follow the same line without tilting in the waist. Your inside thigh should be able to receive as the spinous process has to turn inwards and need room to do so.
7. You can use your inside lower leg if needed to replace the whip aid given on the ground in the girth area. Each aid you give with the inside leg has to be received in the outside leg. If this isn't done the horse will fall over the outside shoulder and start travelling sideways. The outside leg can be put slightly behind the girth, making sure that the outside hind leg is tracking the front leg and thus, not stepping outside of the horse's mass.
8. Enjoy the process and don't tire the horse too much 😊

## CHALLENGES & TROUBLESHOOTING

### 1. Inverted rotation

This is by far the main challenge. It can be caused by the preferential or asymmetric rotation of the horse itself, the overbending of the head/neck and/or disturbance of your seat- and rein aids:

- In case of preferential or asymmetric rotation of the horse you can restore correct bending through the use of the shoulder-in and guidance of your seat and rein aids.

On the ground, you can use your whip over the outside shoulder. However, Inverted rotation is hardest to restore when using one rein so it might be best to switch to either in-hand or ridden work before continuing to groundwork.

When working with two reins, you can use both the whip and outside rein. If ridden, you can use your outside thigh and leg as well as your shoulders and outside rein to guide the horse into the proper circular posture.

- If the inverted rotation is induced by overbending of the head/neck, gently push the nose back in front of the sternum with correct opening of the jaw. Range of motion for lateral bending is greatest in the cervical spine and this is why horses overbend their necks so easily. Therefore, make sure to never 'over ask' the stelling as it's usually less than you think. If you too much with the inside rein, overbending will be the result. So remain soft in the inside rein It might help to visualize your hands are not attached to the head and neck of your horse, but rather that it is attached to the shoulders of the horse.

When working with one rein, you can gently use your hand to push the nose back and use the whip to control the outside shoulder at the same time.

When working with two reins and ridden, you have to give the inside rein forward while making a slight turning half-halt with the outside rein.

- If the inverted rotation is caused by disturbance of incorrect seat- and rein aids you will have to work on those that hinder the horse most. The more you can master your own body, the better you will be able to guide the horse.

## **2. Falling on the inside shoulder**

Naturally horses turn by pushing the weight unto the inside front limb while placing the head/neck to the outside as a cantilever. This is why counterbend appeals more to their natural tendencies while inside bend is a more alienated shape. Therefore, the falling on the inside shoulder is quite common. When this happens, the horse usually also tilts with the head and becomes heavier on the inside rein.

To restore this problem, rebalance the horse vertically in the rhythm of the inside front limb or ask a few strides counterbend if needed. Correct unilateral contraction of the thoracic sling muscles is vital as this allows the horse to stabilize it's ribcage in the middle when one front limb is in the air.

A few steps of Travers/Renvers of the wall is also very useful to lift the inside shoulder. However be careful, especially in the case of travers, that this doesn't induce inverted rotation.

## **3. Falling on the forehand and dropping too low in the neck.**

On the ground, this usually happens due to the horizontal imbalance of the horse or a pulling forwards on the cavesson noseband to ask the horse to transition into movement.

In groundwork, you can resolve the problem by placing your hand next to the cavesson and to ask the horse forward by means of a whip aid from behind instead. Always think the horse moving from the hind limbs into your hands.

When working with two reins and ridden, make sure the position of your hands is not too low – i.e. below the point of bit of noseband. This – unintentionally – creates a draw reins effects and forces the horse downwards. Furthermore, make sure to make enough lifting half-halts to encourage the horse to lift its thoracic sling throughout and to promote postural changes. You can use your lower legs to encourage the hind limbs to travel under further as well.

## **4. Travelling sideways.**

In a correct lateral bend, the horse will always have to remain in a proper forward. That means, feet and nose pointing forwards to the direction of travel. When the horse is stiff lateral bending is difficult, the horse might lose the forward and start travelling sideways – more like a leg yield - rather than really bend through its body.

If this happens on a circle, restore the forward by thinking forwards and making the circle bigger or go back to working on vertical balance on the straight line or a square

first. When your horse is more advanced you can use a haunches-in aid when the outside hind limb is trailing out, to place it back under the horse's mass, or the shoulder-in aid when the inside hind limb is trailing out.

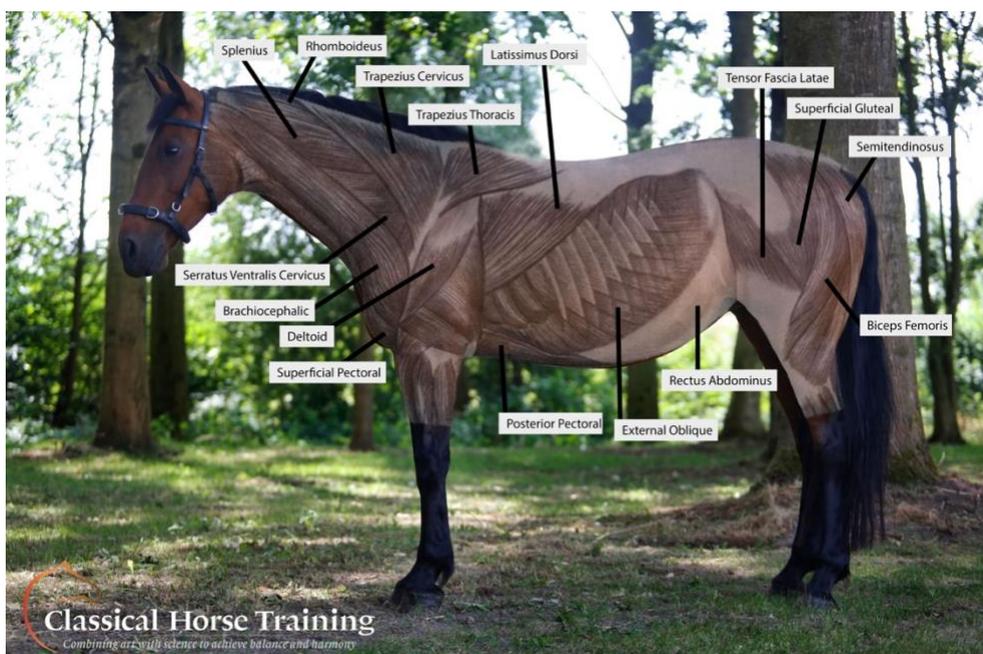
If the horse starts travelling too much sideways in lateral movement, you can close the angle and or apply momentarily aids for the opposite movement to control the straightness and forward. For example, a horse that trails out behind in the shoulder-in – than it is more a haunches-out or leg yield than a true shoulder-in – can be restored in shape by providing a momentarily haunches-in cue just enough so the outside front limb and pelvis align forward again and then continue in the shoulder-in. This way, you use the exercises in a close relationship as a means to and end rather for the exercise on its own.

## 5. Fatigue.

Remember, circles are the hardest exercise for the horse as it is completely alien to their natural way of turning. Therefore, don't overdo it and give plenty of breaks and variation in between. Same goes for lateral movements.

## RELEVANT STRUCTURES

As you are aware by now, the body is interconnected. Therefore, lateral bending requires full engagement of the entire body and mind of both rider and horse. However, below you can find some of the most important muscles and soft tissue activated by this posture.



## **BRACHIOCEPHALICUS**

**Function(s):** Laterally flexing the head to the same side of contraction and drawing the limb forward when the head and neck are fixed or extending the head and neck when the limb is fixed.

**Origin(s):** Cleidomastoideus: *mastoid process and nuchal crest of the skull.*  
Cleidobrachialis: *wing of C1 and transverse processes of C2-C4/C5.*

**Insertion(s):** The *Deltoid* tuberosity and crest of the *Humerus*.

**Innervation:** Accessory, Cervical and Axillary

**Notes:** The Brachiocephalic actually consists of two components, namely *Cleidomastoideus* and *Cleidobrachialis* with the latter sometimes also referred to as *Omotransversarius*. It is a superficial muscle found each side on the neck and can therefore be quite easily palpated. This muscle is under a great amount of strain in horses asked in hyperflexed or overbended positions. Also, as it swings the leg forward, movement gets restricted when reins are held too strongly or with uneven pressure (tilting). Horses with restrictions in the Brachiocephalic often display strain at the poll, struggle with circles and might have problems on picking up front lead on the affected side.

Of particular note is the *Cutaneous Coli* that adheres to the lateral and ventral surface of the Brachiocephalic muscle via the *Superficial fascia* midway along the neck and originates of the *Manubrium*. Aside from its relationship and action with the Brachiocephalic, it can show significant strain in horses that jump or work down hills, as it seems to potentially act as part of the *Thoracic Sling* upon landing. A horse may show pain upon palpation where it adheres to the Brachiocephalic muscle.

## **CRANIAL HEAD OBLIQUE**

**Function(s):** Singular contraction: flexing the head laterally  
Bilateral contraction: Extending the head

**Origin(s) :** First cervical vertebrae – C1

**Insertion(s) :** Skull - Nuchal crest, jugular and mastoid process.

**Innervation:** Dorsal branch C1

**Notes:** This short muscle contains a fair amount of tendinous tissue. This muscle becomes strained when a horse pulls back on a head collar or is trained in draw reins.

## **EXTERNAL OBLIQUE**

**Function(s):** Singular contraction: Flexing the trunk laterally to the same side of the muscle  
Bilateral contraction: Compress the abdominal viscera and flex the spine

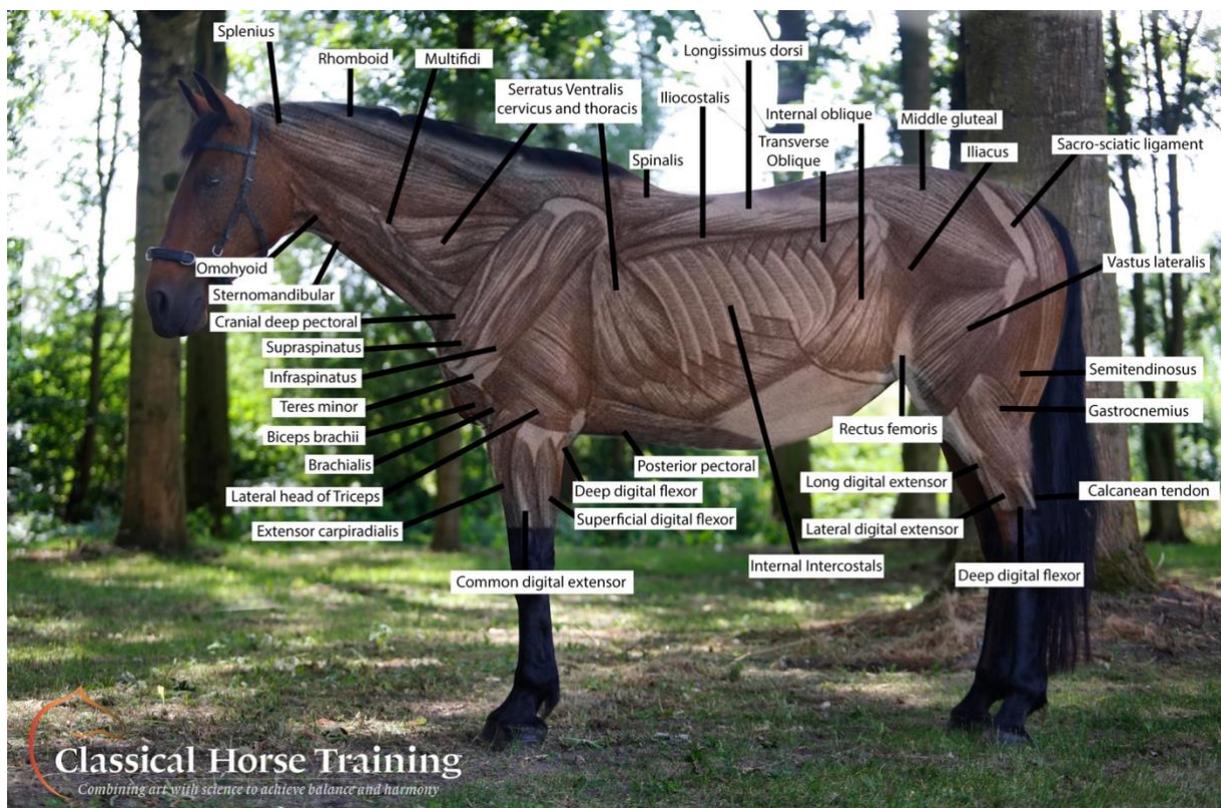
**Origin(s) :** Thoracolumbar fascia and lateral surfaces from the 4<sup>th</sup> rib onwards.

**Insertion(s) :** Linea alba, prepubic tendon, pubis, Tubercosae, ilium and the medial femoral fascia.

**Innervation:** Intercostal, Costal Abdominal and Lumbar

**Notes:** The external oblique is part of four abdominal muscles. It is a superficial muscle and can therefore be quite easily palpated directly under the skin. This muscle is linked to the Rectus Abdominis and Internal oblique as well as the Serratus Ventralis Thoracis through an extensive aponeurosis sheet. It can become quite compromised due to excessive spur use. As it compresses the abdomen, it is extremely important that this muscle contracts in relaxation. Too much leg aid can strain this muscle and therefore 'squeeze' the abdomen. Furthermore, because this muscle laterally flexes the trunk, lateral exercises such as shoulder-in, travers and half-pass, when executed. Correctly, are very important to strengthen this muscle. Pole work strengthens the other obliques.

On a final note, it is important to realize that a well-developed equine core doesn't show muscle linings. Very often, a muscle lining of the Cutaneous Trunci is mistaken for developed of the abdominals which is not the case. A strong core shows in a strong underline and a proper back engagement of the horse.



## **ILIOCOSTALIS CERVICUS**

**Function(s):** Bending and extending the neck laterally

**Origin(s):** It is a continuation of the Iliocostalis thoracis and Lumbarum.

**Insertion(s):** Transverse processes of last 3-4 cervical vertebrae.

**Innervation:** Cervical.

**Notes:** It sits dorsal to the *Scalenus muscle* and lateral to the *Intertransversarii*.

Furthermore, the muscle fibers from the Iliocostalis blend with those of *Scalenus* which makes it an interesting muscle for selfcarriage and supporting the base of the neck. It also is a cybernetic muscle and thus capable to store proprioceptive information.

## **ILIOCOSTALIS**

**Function(s) :** Assisting in expiration

Unilateral contraction: inclining the spine laterally

Bilateral contraction: extending the spine

**Origin(s):** Thoracolumbar fascia and cranial borders from the 4<sup>th</sup>-18<sup>th</sup> rib.

**Insertion(s):** Caudal borders of the ribs, transverse process of C7 and lumbar vertebrae.

**Innervation:** Thoracic

**Notes:** Also referred to as *Iliocostalis thoracis* or *lumborum*. It is a relatively small muscle. In the lumbar region the muscle may vary and insert onto the ilium and or the lumbar transverse processes. It is a segmented muscles and extends across the ribs on the lateral ventral aspect of LD.

## **INTERNAL OBLIQUE**

**Function(s):** Assisting the External oblique.

**Origin(s):** Tuber coxae and the inguinal ligament.

**Insertion(s):** The cartilages of the last 4-5 ribs, linea alba and prepubic tendon.

**Innervation:** Intercostal, Costal Abdominal and lumbar.

**Notes:** Its structure is similitter to that of the external oblique. It can become hypertrophied when aiding the pelvis through engagement or in a support posture for lameness.

## **LATISSIMUS DORSI**

**Function(s):** Flexing the shoulder.

When acting together, if limbs are advanced draws the trunk forward.

**Origin(s):** Spinous processes of the thoracic and lumbar vertebrae via the Thoracolumbar fascia.

**Insertion(s):** Humerus

**Innervation:** Thoracodorsal

**Notes:** This muscle is influenced by (poor) saddle fit and girth. It can thus become quite reactive upon palpation.

### **LEVATORES COSTARUM**

**Function(s):** Assisting in inspiration through moving the ribs  
Flexing the spine laterally

**Origin(s):** Transverse processes of the thoracic vertebrae.

**Insertion(s):** Cranial border of the ribs.

**Innervation:** Intercostal

**Notes:** The first rib is excluded from attachment, after which, it forms a series of small muscles thereafter. Furthermore, not all behave as indicated, instead, some choose to pass over a rib and insert into the next (May-Davis 2016).

### **LONGUS CAPITIS**

**Function(s) :** Singular contraction: inclining the head to the same side as muscle contraction.  
Bilateral contraction: flexing the head.

**Origin(s):** Transverse processes of C3-C5

**Insertion(s):** Ventral occipital bone

**Innervation:** Ventral branches of cervical.

**Notes:** The Longus Capitis is the largest of the head flexors. Its muscle belly is largest at C2, where it is easily accessed underneath the Brachiocephalic. This muscle becomes quite stimulated at correct high dressage level due to its ability to keep the poll flexed and fixed. Naturally, it becomes strained in Rollkur or when using drawreins.

### **LONGISSIMUS DORSI**

**Function(s):** Bilateral contraction: Extending the lumbar, back and neck.

Singular contraction: Flexing the spine laterally

May also assist in expiration due to its costal attachment

**Origins(s):** Ilium of the pelvis, S1-S3, lumbar and thoracic spinous process and Supraspinous ligament

**Insertion(s):** Transverse processes of the lumbar, thoracic and last four cervical vertebrae.

Articular processes of the lumbar. Spinous process of C3-C7 and lateral surfaces of the ribs - except the first rib.

**Innervation:** Thoracic and lumbar

**Notes:** LD is the longest overall muscle in the horse's body. It is a superficial gymnastic muscle and can therefore be palpated directly. It is often pictured as a long and thick bungee cord stretching all the way from the sacrum to the last four cervical vertebrae. However, in reality this muscle is made up of segments of muscle that only run a short way, not the whole length of the back. Fascicles, bridge about three-five vertebrae. This is important to remember as it provides some implications for certain training practices which I will discuss later on.

The Middle Gluteal Tongue also attaches to LD usually somewhere between T15-L1. Each horse is different in the length of the Tongue, but is essential to determine its attachment point into LD, especially when the SI joint is strained. This is because LD originates on the Ilium of the pelvis and its position altering due to torn ligaments releasing tension on the Ilium and thus sub luxating the SI joint as direct result.

### **MULTIFIDI**

**Function(s):** Singular contraction: Flexing the spine laterally

Bilateral contraction: Extending the spine

**Origins(s):** Lateral aspect of the sacrum; Articular processes of the lumbar and transverse processes of the thoracic vertebrae.

**Insertion(s):** Spinous processes from C7-S2.

**Innervation:** Thoracic and lumbar

**Notes:** It is a segmented muscle. Multifidi muscles support segmental stabilisation, proprioception and posture. Its fascicles lie close to the vertebral column and pass over several vertebrae before insertion.

### **PSOAS MAJOR**

**Function(s):** Flexing hip joint and rotate the femur laterally.

It also consorts with the Iliacus.

When the limb is fixed, it induces spinal and pelvic flexion.

**Origins(s):** Last two ribs, lumbar vertebral bodies & transverse processes

**Insertion(s):** Lesser trochanter of the femur in common with the tendon of Iliacus

**Innervation:** Lumbar and femoral.

**Notes:** This is the largest flexor muscle of the hip joint. In some horses, this muscle extends beyond the lumbar transverse processes before entering into the groove of the Iliacus. Psoas Major and Iliacus combined form the *Iliopsoas*.

### **PSOAS MINOR**

**Function(s):** Singular contraction: Inclining the pelvis laterally  
Bilateral contraction: Flexing the pelvis

**Origin(s):** Vertebral bodies of the final three thoracic vertebrae and ribs and L1-L5.

**Insertion(s):** Psoas tubercle of the Ilium

**Innervation:** Lumbar

**Notes:** It is a deep muscle and can therefore only be palpated indirectly. It contributes to stability of the lumbar spine.

### **QUADRATUS LUMBARUM**

**Function(s):** Singular contraction: Flexing the lumbar region laterally.

Bilateral contraction: Fixing last two ribs and lumbar vertebrae which assists in the action of the diaphragm.

**Origin(s):** Last two ribs and the lumbar transverse processes.

**Insertion(s):** Wing of sacrum and the ventral sacroiliac ligament.

**Innervation:** Lumbar

**Notes:** It is considerably underdeveloped in comparison to other vertebrates.

### **RECTUS ABDOMINIS**

**Function(s):** Limiting extension of the spine – thoracic to sacrum  
Assisting the obliques

**Origin(s):** Outer surface of the sternum; 4th or 5th - 9th costal cartilages of the ribs.

**Insertion(s):** Pubis of the hip via the prepubic tendon.

**Innervation:** Intercostal, costal abdominal and lumbar.

**Notes:** The general function of Rectus Abdominis, and also of the active external oblique, is thought to oppose the forces exerted by the moving visceral mass and abdomen and therefore limit the passive extension rather than to create active flexion.

It walk and trot it has an opposing relationship to Longissimus Dorsi, but in trot both muscles might work together to ensure smooth motion. “During walk Longissimus Dorsi

*showed only weak activity bursts in the middle of the stance phase of both hind limbs while Rectus Abdominus was not active throughout the stride cycle (...) At trot, Rectus Abdominus is active during extension while Longissimus Dorsi is active during flexion (...)” (Tokuriki et al. 1997). At canter, The LD is active once per stride from after the end of the diagonal stance phase to the beginning of the following one to prepare the landing of both hind limbs and to induce spinal extension before fore limb landing. The Rectus Abdominus is active during the support phase of the non-leading diagonal. It acts to support the visceral mass and to initiate thoracolumbar flexion during the leading fore limb stance phase and suspension phase. Bursts of activity can be observed simultaneously in the LD and RA on the side opposite to the leading fore”.*

### **RETRACTOR COSTAE**

**Function(s):** Retracting the last rib.

**Origin(s):** Transverse processes of first 3-4 lumbar vertebrae via the lumbar fascia.

**Insertion(s):** The caudal border of the last rib.

**Innervation:** Lumbar

**Notes:** This muscle has been referred to in some text as a part of the Internal oblique. Its fibers are more tendinous in nature than muscular. It can also be larger or smaller according to the lumbar attachment or at times in two distinct sections giving rise to 2 muscles as opposed to one (May-Davis 2016).

### **SCALENUS**

**Function(s):** Unilateral contraction: Flexing the neck laterally  
Bilateral contraction : Flexing the neck ventrally

**Origin(s):** Cranial and lateral border of the sternum rib

**Insertion(s):** Ventral part: *Transverse processes of C4-C6.*  
Dorsal part: *Transverse process of C7.*

**Innervation:** Ventral branches of cervical

**Notes:** This muscle has postural value as it becomes heavily loaded in self-carriage. It can also be recruited to some extent to support the lower cervical vertebrae from below which is needed for horses lacking the lamelle on C6-C7. Together with the *Longus Colli*, it assists in raising the base of the neck giving leverage to the *Rhomboideus* and *Trapezius* to telescope.

### **SPINALIS DORSI**

**Function(s):** Assisting the LD to extend the lumbar, thoracic and neck.

**Origins(s):** Spinous processes of T1-T6, T13-T18 and L1-L6

**Insertion(s):** Spinous processes of C3/C4.

**Innervation:** Thoracic and lumbar

**Notes:** A relatively short muscle compared to Longissimus Dorsi. It assists LD in function and is often considered part of LD or its extension. This muscle extends into the wither region and can be influenced by saddles with high gullets.

### **TRANSVERSE ABDOMINAL**

**Function(s):** Similar to the External and Internal oblique muscles.

**Origin(s):** Thoracolumbar fascia to the transverse processes of the lumbar vertebrae.  
The cartilage of the last twelve to thirteen ribs integrating with fibers from the diaphragm.

**Insertion(s):** Xiphoid cartilage and the linea alba.

**Innervation:** Intercostal, Costal abdominal and lumbar.

**Notes:** The muscle is thickest along its cartilage attachments and thins out greatly towards its aponeurosis and lumbar region.

**THE END 😊**