Physiotherapy and the Lungeing Course

I have worked closely for more than seven years with Maike Knifka, osteopathic physiotherapist for horses, as I find that linking physiotherapy with training according to the „lungeing course"-method makes a wonderful combination. Maike teaches lungeing work according to the lungeing course on practical courses as well as at an educational institute for training osteopathic physiotherapists.

I am delighted that Maike was ready and willing to explain to those of you keen to know more of the underlying science, how the biomechanics of the body work in greater detail.

Maike has also written another paper in which she explains how to do practical exercises which particularly support the lungeing course work. You will find it as a download in the Media Library. There are also videos that illustrate the practical application.

And with that I hand over to Maike.

Babette Teschen

Biomechanics and Physiotherapy by Maike Knifka

Translated by Katy Schütte

This photo is of me and my Knabstupper gelding Lillebror. I am a physiotherapist and osteopath for horses and a trainer.

When you take a look at my Lillebror here what is your reaction? What stage of training do you think he is at? What do you think of his muscle development?

Did you realise that Lillebror was only four years old in this photo and had never been ridden?

He just has lovely, very well developed muscles. But no horse can naturally use them to carry a person and no horse knows automatically how to move well extended and well

balanced on a lunge. Even a young horse with naturally strong muscles has to learn how to use its muscles in new ways and how to strengthen them.

Why this is and what it means to train your horse's muscles like this so that these new ways of moving, that are, for example, necessary when you lunge or ride your horse, can be strengthening and health improving is what I shall cover right at the beginning of this chapter on biomechanics and physiotherapy.

The basics of the muscular system

The horse uses a whole range of muscles to set its skeletal system in motion. Each muscle of the skeletal system is attached at one end by a tendon of origin and at the other by a tendon of insertion. These origin and insertion tendons are joined to the periosteum. The origin of a muscle is basically at the more fixed body part than the insertion of the same muscle. An example of this would be, for instance, that in the wide back muscle, which runs from the back to the upper foreleg, the origin of the broad back muscle is at the back (or to put it more exactly in the fibres of the back) and the insertion is in the upper foreleg, corresponding to the relative moveabilty and proximity to the torso. This division does not, however, have an effect on the distribution of strength in a muscle.

Do you actually know the only thing a muscle can do? One hears people saying things like "he's hollowing his neck" or "he's hollowing his back". But in actual fact all that a muscle can do is contract.

Contraction means that the muscle pulls itself together. The opposite of this is stretching or relaxation. But a muscle cannot actively do this, to do it an antagonist, an opponent, is necessary.

So we are dealing with a system composed of agonists and antagonist, that is of pairs of muscles that could be said to help each other out of contraction, in order to really slacken properly. This only works perfectly when these muscles are physiologically stressed. They must therefore be set up to function in the way that nature designed them to be.

You probably already have a negative example in mind: a horse with what is called a hollow back, like the one you can see in the photo on the right.

This is how it looks when the back is not rounded up enough by a well tensioned nuchal muscle. The result is that the horse's long back muscle is perpetually strained when it has to do weight bearing work that nature never intended it for. Its antagonists – the stomach and loin muscles – are not engaged enough to contract and really free their agonists from their contraction.

The result: permanent negative strain.

Fleshy and sinewy muscles

Muscles are divided into fleshy or sinewy muscles according to their function in the horse's body and the way they are built.

A proper fleshy muscle, like for example the horse's long back muscle, acts through long fibres and is therefore designed to be able to pull itself together strongly. Fleshy muscles are not suitable for lengthy contraction or expansion they are meant to expand and contract rhythmically in order to receive an adequate blood supply.

Sinewy muscles on the other hand are intented to be able to hold their position.

An example: At the rear end of your horse there is the long buttock muscle marked in the photo with a red arrow. This is the semitendinosus muscle, or the "half tendon" muscle.

This muscle can be used in many ways by the horse. When the leg hangs, as it does when the horse swings its leg forwards, it is responsible for movement of the stifle. However when the leg is weight-supporting the buttock muscle has the function of stretching out the hip, stifle and hock joints at the moment of take off.

Because of its sinewy make-up it is however not just a thrusting muscle but can also be used as a contracting tension band, when the horse, for example, moves the joints of its backlegs flexed in collection. A "contracting tension band" means that on the one hand a contraction (that is a tension) takes place in the muscle, but that on the other this condition can be sustained through the web of sinews without becoming tired.

Why does good muscle training matter?

We can see from the example of the buttock muscle that the horse is able to use its muscles for different sorts of movements. Another example is the long back muscle. When in good, well trained condition it is

- on the one hand responsible for the strong development of forward thrust, that is for locomotion and
- on the other because of its proximity to the horse's spine it also takes part in the fixing of the spine for the purpose of immediate flight.

Both these functions will in any case remain, but it lies in our hands which one becomes ever more developed in the course of training.

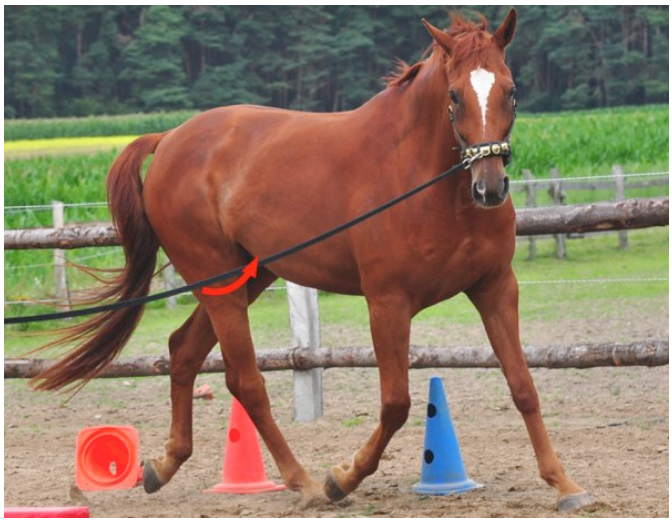
On this theme, here is a quotation from Jean-Marie Denoix[1]:

"The functionality of movement, that is the art of riding. And the art of riding means: awaking and maintaining and giving direction to the ability of the horse and doing all this in harmony of body and spirit."

So to train a horse "well" we must take into account which muscles are naturally responsible for which movement and which muscle we need to strengthen so that the horse can carry out the movements that we want it to.

Another example: We would like the horse to have a swinging energetic back. But does it make sense just to concentrate on strengthening the back muscles? Certainly not, as in order to round up its back the horse needs to learn how to activate the antagonists of the back muscles, so not just push strongly with the help of the back, croup and hindquarter muscles but also the proper expansion of the back muscle by engaging the stomach and loin muscles actively at the moment of suspension as well as employing the nuchal system.

In the following picture you can see Ronaldo's stomach and loin muscles at work (red arrow):



Now let's dive a bit deeper yet into the physiology of muscles:

Simply put, muscle fibres work physiologically correctly when they can fully expand again after contraction. When the already mentioned fleshy muscles work by rhythmically exchanging the development of tension (contraction) and relaxation (expansion), they are doing what is called dynamic muscular work. And this ensures good circulation, as fresh blood can flow into the muscle during each expansion phase. This is important for the metabolism as not only is fresh blood supplied to the muscle

[1] s. Denoix, J. [u.a.]: Physiotherapie und Massage bei Pferden.(Physiotherapy and Massage for Horses) 2nd edition Stuttgart: Verlag Eugen Ulmer, 2000

but waste products of metabolism are also carried away. If these waste products were not carried away, it would lead to a decrease in performance and through continuous contraction, to pain, too.

Furthermore it can cause atrophy, the wasting of the muscles, as you can see in the following picture. Here "holes" have developed next to the withers and the spine is visible. This indicates an atrophy of the trapeziod muscle and the long back muscle:

All the large muscles of movement in the horse's body carry out this dynamic muscular work, an example is, once again, the long back muscle of your horse. The muscles with sinewy deposits are responsible for the static holding work, as has already been described in the example of the buttock muscle.

Muscles with sinewy deposits are also to be found in the horse's neck, for example the muscle that carries the head. For this muscle must also be trained as the weighting of a horse with a rider leads inevitably to this muscle having to do more than it would if the horse was just moving freely around in its field.

An important ground rule is: The circulation in a muscle depends on the type of work it is asked to do. And what work can be done by which muscle depends in turn on how it is built up.

Look at my Lillebror again on the right. The strongly pronounced upper neck muscle that you can clearly see is carrying the head.

In spite of his already well developed muscle Lillebror too, when ridden, will in quite a short time start to shake his head,

possibly yawn or either put his head right down or carry it right up high. This is in no way a sign of disobedience, but just because he is no longer able to hold the position you want.

So training your horse's muscles properly basically means,

- that you should only ask the muscles that are intended to be used thus for holding work and continuous tension and
- that the large muscles of movement must be trained dynamically.

With a horse displaying a correct outline you can observe this healthy interaction which is orientated to the horse's natural make up:

The back is tensioned by the forward-backward position of the neck which does the static muscle work. This allows the back muscle to to its job and take care of forward movement, since it does not have to do any weight bearing work as this is being done by the positive tension curve.

In this position the back muscle can work dynamically, which means that it can yield properly in the relaxation phase because of the hindleg swinging actively forward and the muscles of the undercarriage working. This results in a well-balanced interaction between top line and undercarriage.

Taking the nature of the horse into consideration is not just essential in relation to the physical point of view. Read on about the mental processes and make up that we meet when we want to use our horses for our own purposes.

Learning to move well is a process that is both a psychological and a physical process.

You have probably often heard that the horse is not designed by nature to carry a rider. Just to strengthen this somewhat reproachful sounding phrase a bit, I would say that a horse is also not designed to move in a circle and especially not at a trot.

You have already read, learnt and probably had your own experience of this while doing the lungeing course.

It is comforting to know that there is a way to get the horse to do it all and that it is called learning and teaching.

The important thing is the teacher – and that's you!

You know from your own previous experience that learning can only take place when the atmosphere is calm and relaxed and when one has a patient and skillful teacher.

You are that teacher!

And in contrast to lessons from other people, you have a special role here in that you are dealing with a living thing that is equipped with a body and instincts suited to a life in wide open spaces. Something quite different to 6m voltes, collection, tight bends etc.

Critical to your teaching is knowing that the horse is also a perfect energy saver and will always try its best to avoid bodily discomfort and the expending of unnecessary energy. This quality is the result of the instinct for survival which requires the horse to be ready for flight and to have enough energy reserves for it at all times. This means that you have to succeed in the course of training in making the horse realise that it can also feel safe while doing the movements that it needs to learn so that it can be a riding horse.

A horse's body, when healthy, strives for balance, efficiency and a sense of well-being. If a horse is unbalanced in its movement it feels impeded in all its biomechanics and cannot gratify its instinct for the effective use of strength and balance to achieve a sense of well-being.

We must never forget: balanced movement, and balanced movement on both hands too, is a movement that is **not in the nature of a horse** as it is ineffective in terms of a flight reflex. So on the way to straightening up the horse has to give up its instinctive pattern of movement and replace it with a new one. This means that from the point of view of a physiotherapist straightening up is a psychological as well as a physical process.

In the process of learning the physical skills the horse develops the skills consciously to direct these new movements that are also affected by psychological factors. It learns to translate its desire to move effectively and using as little energy as possible into moving well balanced on a curve without wasting its energy.

In sports medicine, we speaks of a dynamic model. This means dividing a movement up into different steps, which are then repeatedly practised and then finally fused together in order to be able to order them into a definite repetoire of movements.

What actually happens to the horse's body when it moves without balance? Why is this detrimental to its health?

If the horse moves without balance, this is because it has not yet learned what it has to do to find its balance. It only responds to the demands made and uses its natural movement pattern.

In this case you probably will see:

- high speed,
- a high head carriage,
- body turned to the outside,
- a short topline,
- the hindquarters swinging outwards,
- leaning into the circle,
- the neck bent outwards and
- falling out of the outer shoulder.

On a mental level this leads to stress, anxiety and misunderstanding. This connects to the activation of what is called the sympathetic nervous system. That is the part of the autonomic nervous system that could be said to activate the method of flight. This increases the risk of injury as the increased released of adrenalin suppresses sensitivity to pain.

With the activation of the sympathetic part of the autonomous nervous system comes a reflexive (that is a reflex unconsciously set in motion) tensioning of what is called the cybernetic or proprioceptive muscular system. This muscular system lies deep near the joints and serves during flight to, for example, fix individual inter-vertebral joints. If the horse remains continually in this mode through stress and strain, it is impossible to create a calm atmosphere in which teaching and learning are possible.

Seen from a physical point of view the main problem is that the various different components of the body of the horse have different directions of movement because of the movements made in search of balance. Various structures are overburdened and can be damaged.

In order to protect itself the horse unconsciously tenses the propriozeptive muscle system already mentioned above, which is responsible for stability and for the protection of the joints. Through its receptors for deep sensitivity it comes in over-strained conditions to a reflex contraction of the muscle-joint units and thus to complete tension and restriction.

In addition unbalanced movement in "flight position" supports the development of a muscle picture that we do not want in a riding horse:

- a shortening of the top line through increased tension of the muscular top line,
- a reduction of the stomach muscles,
- a disproportionate strengthening of the buttock muscle from pushing out of the hindlegs and
- a strengthening of the brachiocephalic muscle, which acts as the flight initiator and which, with a high head carriage in an off centre contraction,(insertion and origin lie a long way apart from each other but even so the muscle is contracted and not expanded) quickly grows in circumference, hindering the freedom of the shoulder.

Such an imbalance between the top line and the undercarriage of the horse prevents the horse from moving the large muscles of movement in the back in a healthy contraction and expansion. Continuous contraction, above all in the back and upper croup muscles prevent in their turn the rounding up and tensioning of the lumbar vertebrae, so making the necessary elastic give for hip and loin flexion in the lower back impossible.

The nuchal ligament and the horse's lever

The nuchal ligament is a brilliant construction in the body of your horse that is definitely responsible for the fact that you can use your horse as a riding horse with the ability to carry you. This ligament, that we are about to put under the magnifying glass, runs from the top of your horses back down to the sacrum and as it does so connects nearly all the spinal vertebrae. Thus it is also described as the upper passive tension band – passive because since this ligament it not able to contract like a muscle it can only carry out a stabilising role when we put it under tension through healthy training.

The nuchal ligament is divided into two parts: First there ist the neck strand, that reaches from the top of the spine to where it widens at the cap of the withers. The neck strand crosses the first and second cervical vertebrae without connecting to them and joins only at the level of the third cervical vertebra with the neck plate, which is the second part of the nuchal ligament and which joins the neck strand from the third to the seventh vertebra. The connection with the seventh vertebrae is, however, rather weakly developed, which is why the transition from the seventh and last cervical vertebra to the thoracic vertebrae that join them can really sag down when the head is held too high.

The fact that the neck strand is not connected to the first and second cervical vertebrae and these two vertebrae thus are not connected to the stabilising function of the nuchal ligament system explains the sensitivity in this area with reference to too strong pressure from the hands. Physical force in the form of a strong pull on the bit causes the area from the top of the spine to behind the second cervical vertebra to sink down. The

horse "tucks its head in" and displays a so-called "broken neck", that is behind the second vertebra. The line of the horse's nose therefore should be either in front of the vertical, or on the vertical but never behind it.

The word "wither" meant "contrary, opposing" in old middle English and the development of the withers cap explains how it came by its name: This strong sinewy plate that is joined to the spinous processes of the withers and with runners out into the shoulder blade, puts an abutment there so that the pull of the nuchal ligament, for example when the horse is grazing or stretching out is transferred to the continuation of the nuchal ligament further back and rounds up the back. The individual spinous processes which the nuchal ligament is connected to are properly fanned out as a result of this, so that the distance between the processes is also slightly increased. The longer the spinal processes of the withers are, the more effective the transmission of power to the nuchal ligament.

This construction, by which the horse's neck with the nuchal ligament functions as a power arm with the withers and their spinal processes and the withers cap providing the axis for it, is the front abutment of the nuchal ligament system. By raising its back through tensioning of the nuchal ligament system, the grazing horse is able to relieve the pressure on its back without straining its muscles.

To achieve a rounded up back for our horse on the lunge or under saddle, however, we need a back abutment construction too, so that the lower back is also positively tensioned. Only when the lower back (and in particular the lumbar vertebrae) is raised by the tensioning of the nuchal ligamet can the back swing upwwards, because the muscular structure is free to move.

Your riding stick could provide an illustration to help you to imagine how the tensioning of the back works. If you want to bend it upwards you need both hands. One hand at the front acts as the fore abutment and one at the back as the aft abutment.

Now let's look at the nuchal ligament and the aft abutment for the transmission of power to round up the back:

The nuchal ligament starts at the withers cap and is attached to the spinal processes of the thoracic vertebrae (as a rule from the spinal process of the fifth thoracic vertebra) as well as to the spinal processes of the lumbar vertebrae and the sacrum. The rounding of the back through the fore abutment construction has already been described above. To now achieve a necessary opposing pull, so that the whole back together, that is from its aft base too, will be rounded up we need a power arm and an axis again. The power arm is provided here by the ossified sacrum. This power arm moves, for example when our horse steps forward in a stretched posture with active hindlegs, as the sacrum is joined to the hindlimbs through the sacroilliac joint. The axis for this lower power arm lies at the transition from the lumbar vertebrae to the sacrum. This is the place where the

tipping of the pelvis can take place, which we would recognise in an extreme form when the horse does a piaffe.

Why does the horse's back have to be rounded up anyway?

By doing the lungeing course work your horse learns step by step to bend in a correct, that is physically healthy, way. This means that it fits on the curve requested of it without any evasive movments such as

- head shaking,
- falling out of the hindquarters,
- falling out over the outer shoulder etc.

Bending work, whatever form it takes is only ever really effective and able to build gymnastic ability when the horse moves with a rounded up back that swings upwards.

Why is this?

The centre of movement for bending and stretching of the back lies in the lumbar vertebrae. A back that is called sagging or hollowed is stretched whereas on the other hand a rounded back is described as bent.

Our aim is therefore an active rounded back, because only then is the nuchal ligament under tension and the spinal processes spread out. Ligament type structures can only be stabilized when they are under tension, similar to a rubber band.

The horse is equipped, particularly in the lumbar vertebral region, in addition to the nuchal ligament with other ligaments which are tensioned between the individual spinal processes. And these are also unable to carry out their stabilisation function when they are actively tensioned, as ligaments are unable to contract.

The sidewards bend of a horse's vertebrae is always done with a rotating movment, that is a slight turn for anatomical reasons (the arrangement of the joint surfaces, the cross processes.)

The disadvantages of moving without an actively engaged nuchal ligament (the neck ligament will be supported by the upper neck muscles depending on the level of training) are the following:

A hollowed back means that the whole of the back muscles are under continuous contraction, regular contraction and expansion does not take place. The positive action of the active ligament apparatus, namely that the large muscles of movement to the left and right of the rounded vertebrae can move freely, without having to carry out holding work, is lost. This leads to the muscles not being available enough for forward movement, the riding horse has to carry the rider with fixed contracted muscles of movement and in the end with its skeletal system, which inevitably leads to wear and tear and pain and various complaints, such as "kissing spines."

A positively tensioned nuchal ligament system is therefore the most important prerequisite and a required condition for the riding horse's ability to carry a rider.

What does a relaxed lower jaw have to do with correct bending work?

A happily chewing and concentrating and calmly cooperative horse is a sign of good bending work. But why?

The following muscular connections explain why doing correct positioning and bending work sets a chain of muscle functions in motion that reach from the hindquarters right to the region of the jaw joints:

Work on a curve and with sideways movement only has the effect of improving gymnastic ability when the horse has a rounded up and positively tensioned top line, as only then can all the spinal vertebrae successfully bend sideways and rotate in the direction of movement. When these basic prerequisites are in place we activate the inside hindleg of our horse through circles, voltes, weaving lines and sideways movement so that it brings it forward to step more beneath its centre of gravity. Through this at the same time the outer slanting stomach muscle works actively, too, and sets the chain of muscle functions over what is called the wide back fascia in motion, that works further in the following ways:

The wide back muscle rises from the wide back fascia, this muscle is set on to the bone of the upper foreleg and works in synchronism with the deep breast muscle to pull back the forelegs. The deep breast muscle is connected to the breastbone, from where the chain of muscles reaches further through the hyoid (tongue) bone muscles right to the hyoid bone. When it arrives here the horse is prompted and encouraged to lick and chew through the active work of this chain of functions. This relaxes its jaw and relaxes through a further muscular connection to the lower main bone of the poll as well as the short neck muscles.

Here it comes full circle as it is now emphasises how important a free and relaxed poll is to achieve position and bend. A tense poll, for example because of a badly fitting tack or a missing tooth, can be said to interfere on the "route back" through the chain just described with the free work of the relevant muscles. This means that a fixed poll with no give in it stresses the hyoid bone which then leads to a similar chain reaction the other way round, so that the muscular structure connected to the hyoid bone and the lower neck is also stressed.

Getting your horse to chew is therefore not so much a matter of working with or without a bit, but of whether you are working your horse in a correct bend.

So in connection with this your horse is always giving you a small compliment when during leading in position and bending it begins to chew.

Fascinating Fascia

Fascia are the bands of fibrous connective tissue that cover individual muscles and connect the whole body in a kind of network and (for example) carry contraction information from muscle to muscle and take part in the formation of chains of muscle function.

The wide back fascia is an enormous strong fascia that lies along the horse's back and is attached to the supraspinal ligament and the end of the spinal processes of the thoracic and lumbar vertebrae. Various muscles have their origin here, muscles that run both fore and after, so that the wide back fascia can be seen as the "switch" for the action of the back and the interplay of forehand and hindquarters.

There can be no bend without position – but why?

The setting of the poll, which is more or less the originator of a correct bend throughout the horse's body, takes place at the horse's poll, or to put it more precisely in what is called the first head joint, which connects the back of the skull with the first vertebra.

The muscles that generate these small straightening movements of the head to the right and left are, above all, the short neck muscles. They have their origin at the first cervical vertebra and insertion at the occipital bone.

The range of movement in this transition from the occipital bone to the first cervical vertebra is only very limited but this joint is, even so, movement limiting, for example through an over tight head position that prevents sidewards movement of the head, the bend of the neck can as a result not take place without a counter tension, such as for example head throwing or leaning on the bit. The longer muscles of the neck, that are responsible for the bend, do not only have the same fascia connection as the small neck muscles, but also for the most part the same the same point of origin at the occipital bone. So if the deep layer of muscle in the small neck muscles are under tension, the muscles of the neck that lie over it are also unable to work without tension.

This explains the phrase so well known to all riders "No bend without position". The position of the first head joint is therefore the first part of a chain reaction that ought to move through the whole of the body.

A fixed first head joint also as a result usually hinders the relaxation of the hyoid (tongue) bond and the loosening up of the jaw joints as there is a muscular connection between the occipital bone of the horse's skull and the hyoid bone.

The correct positioning of the poll is easy to see in some horses because the crest of the mane tips to the bent side when you ask the horse to stand in position. There is also an anatomical explanation for this for which we have to go deep into the anatomy of the horse's body.

You have already seen that the horse is equipped with a neck cord that runs to the withers cap. This neck cord is attached to the occipital bone and attached at a small

protruberence on the underside of the occipital bone scale. This place of origin divides the neck cord for a short way into two parts, the neck cord is here therefore a pair of two strands. This means that in this place there is always a difference in tension between the left and right points of origin when the horse's poll is correctly positioned.

This difference in tension means that the neck cord, which forms the underlying base for the mane, always falls to the side of origin that is less under tension.

So if your horse is, for instance, positioned to the left, the left point of origin of the neck cord is less under tension than the outer point of origin and the tipping in of the mane will be caused by this tiny difference in tension and increased by the crest with its fat deposits, small or large.

Let's go a step further still and ask our horse to set its poll not just while standing but also by bending its whole body. You can observe another particular characteristic of your horse's body: the lowering of the inner hip:

You have already seen that the bend in the spinal vertebrae, because of the wide cross processes, particularly those of the lumbar vertebrae, go along instead of making a rotating movement. If you position and bend your horse at a halt the spinal processes of the vertebrae tip a little to the outside. In the area where the lumbar vertebrae meet the sacrum and from here to the hip bones this causes the inside point of hip, because of the slight rotation, to be brought slightly forward. To balance this the horse puts its weight a bit more on the outer hind leg, as a result of which the inside croup is a little more relaxed and so is held a little bit lower down. The inner side of the hip is thus now bent in the direction of movement and sunk down. You should congratulate yourself if you can see this in your horse as if so, then your request to bend, started by the correct positioning at the poll has travelled the length of your horse's body (your horse is supple).

Warning - sensitive zone: the biomechanics of the poll

Those of you who have already had the opportunity of holding a model of a horse's skull will well remember that one has to watch out that it does not fall apart! It is the muscles, sinews and tendons that hold the lower and upper jaws, the occipital bone, the hyoid bone and the neck vertebra together.

At the temporal bone, where the jaw joints are, the hyoid bone is also attached with cartiledge. The hyoid bone in addition has a muscular connection to the poll, the nuchal ligament is attached on one side and on the other the first cervical vertebra has both its small joint surfaces.

You already know that due to this connection the looseness of the poll muscles of your horse rely among other things on the biomechanics of the jaw joints. When you now also realise that the bony elements of the ears are also to be found in the temporal bone we can be quite sure that we must be very careful when dealing with this area. As soon

as we influence the poll area through our work, to a certain extent we hold the whole "control centre" for the horse's evenness and balance in our hands.

If you think about how long the upper and lower jaw of the horse is, you will surely realise what a lever acts on your horse's poll when you put pressure on it through use of a bit, a bitless bridle or a cavesson.

I think it is very important to be really aware of this "power" and I plead for knowledgeable and careful treatment of this area which is likely to be that much better the more you know about this area of your horse.

But why is the poll region so sensitive and prone to pain, the creation of behavioural anomalies, irreparable damage and real traumas that can lead to unrideability?

The answer to this question is extremely complex so I want to divide it into two parts:

- the mental components and
- the physical components.

The mental components

Does your horse confidently offer its head to be haltered up or readily take the bit when bridling? Does it relax and chew when working and "give" you its poll? Then you can be sure that you are an excellent trainer for your horse and you should be thankful to your horse for having this confidence in you as it is not something to be taken for granted.

By working with tack of every sort we are fixing the head of the horse, a flight animal. This is rather dramatically put on purpose, to spell out to you what a gift you have in your hands when your horse, for example, works confidently with you on the lunge.

The horse uses and needs its neck as a balancing rod in all life's situations. One is flight, for which every horse's nature prepares it to be ready at all times. Thus every form of force and pressure is a limitation of this natural behaviour. Of course it is obvious that you do not want your horse to flee while it is working. But to prevent it, you need the confidence of your horse. Every type of pulling on the reins or the lunge and all the range of restraining sidereins hinder the horse from developing this necessary trust in you. Perhaps the sidereins are in fact the absolute symbol for a key problem between man and horse:

With our highly trained hands we want to grip and hold in order to achieve what we want and place ourselves without realising it in conflict with the nature of horses and their methods of communication.

The physical components

The area of the skull and the poll is held together through countless soft part connections, that is through many ligaments, joint capsules, muscles and sinews. These soft parts are provided with many receptors that on increased tension and false positioning give warning to the central nervous system through which an immediate

command to regulate the situation is generated, resulting in the display of one of the bodily positions that we do not want.

An example of this: You are working with your horse at the cavesson and have not noticed that your lunge is jerking (the connection is not calm but continually giving unintended tugs).

You horse certainly notices this, as it is uncomfortable. Eventually it finds it painful, as through the long lever from the metal nose fittings to the poll it is very easy to exert too much pressure particuarly on the connection between the poll and the first vertebra. The receptors described above report this pain and the resulting reaction is the tensing of the small neck muscles to protect the painful joint.

In these circumstances you notice either that your horse does not want to position itself at all any more or that it evades it eventually by only using the second head joint which goes hand in hand with an evasion.

You can imagine what happens when such a scenario continually takes place: it leads to continuous false positioning and over pressurisation.

Particularly dramatic consequences attend the use of sidereins that are too tightly adjusted so that the line of the horse's nose falls permanently behind the vertical. This position is harmful in many respects, but let us just take a look at what happens in the poll region:

You have already learned that the nuchal ligament of the horse is joined to the poll. It spans both of the first vertebrae without direct contact. So that it can glide over both of the first two vertebrae, a bursa is situated here. Bursa are small bags filled with joint fluid that function as slides and reduce rubbing. When the line of the nose is behind the vertical there is always too much pull on the nuchal ligament and the bursa described is irritated by the pressure. This leads to pain and with continual false positioning the bursa can be so irritated that it becomes inflamed. What is called a poll swelling results that is very painful. If something like this happens then uncooperative behaviour is naturally not surprising.

Conclusion

Knowledge of biomechanical and physiological interactions is of great assistance to working our horse in a correct and healthy manner. I hope I have been able to provide you with some new informations.

To accompany this section I have worked out some helpful physiotherapeutic exercises for you that you will find as a written description and in videos in the Media Library.