

Lessons From a Dissection – part 1 - Loosen Your Noseband!

I recently attended a horse dissection undertaken by Sharon May-Davis, the second one I've attended. Some of my friends and family made horrified faces when I explained what I was doing on the weekend. My Mum asked – "Why do you go to these things? Don't you prefer live ones?" I do definitely prefer the live ones. For them, I'm open to learning everything that I can. And boy, at a dissection you get such an intimate look into the workings of the horse. All the horse's secrets are revealed.

This year, our horse was a 6-year-old off-the-track thoroughbred mare who had lameness and behavioural problems which had been getting worse. She had become very stressed and anxious. Her owner had worked with her over time with healthcare professionals, but when the mare's condition continued to worsen, her owner made the decision to euthanise her – a heartbreaking decision made with the horse's welfare at its core. Present at the dissection were some 20-odd saddle fitters, hoof care professionals, body workers, trainers and others – all wanting to take away from the experience that knowledge would help the living.

In this first post my topic is what I learnt about tight nosebands from the dissection.

In the dissection, we were all given a chance to palpate every aspect of the horse: muscles, joints, tendons, ligaments, fascia, organs and other tissues (with gloves on, of course). This gave us a degree of insight that it is not possible to get with a living horse. As the dissection commenced, muscles were removed one by one – done so precisely, each one looked like a little package. In no time the horse looked like a 3-D model.

The skin had been removed from the horse's head, and we were invited to palpate a long, smooth muscle starting some three-quarters of the way up the head, which ran down to the horse's upper lip. Sorry, I forgot what the muscle was called – but in any case, there are a lot of muscles running to the horse's nose and lips. These numerous muscles are what allows the horse to delicately use his lips and muzzle to pick and choose what plants he's going to eat – and also to sift aside all those expensive supplements we try to feed him! This particular muscle was soft, pliable and smooth to touch. Once we were familiar with its 'tone' and what it felt like, a volunteer applied a relatively tight noseband in the usual place – which happened to be about the middle of the muscle we were palpating. The effect on the feel of the muscle was really horrible! It went from being soft and pliable to feeling like a block of wood. The mechanical effect of a tight noseband made it feel like a braced muscle, even though the horse was not alive to actively brace it. When the noseband was loosened, once more we could feel the soft and pliable muscle. If the noseband was slowly and progressively tightened, first the muscle felt soft, then a little impinged upon, then a bit braced, then a block of wood.

One of the thoughts that occurred to me through this palpation is that if the living horse is bracing against us, first we should make sure that nothing is bracing against him – this includes the gear that we use on him, as well as ourselves. So – loosen that noseband! In fact, you might consider removing it altogether.

Lessons From a Dissection – part 2 - The Mouth Is Connected to The Hind Legs

This is the second chapter of a series where I want to share what I learnt in a horse dissection recently. In a post that I wrote about the previous dissection I attended a year earlier (also conducted by Sharon May-Davis), I wrote about a palpation we did which allowed us all to feel how a bit applied with downward pressure on the horse's tongue actually limited the range of motion of the hind leg. This clearly showed that the linkage between mouth and hindquarters was a mechanical linkage with real effects for the horse's body. For this year's horse, we tried to do the same palpation, but this mare had very poor range of motion in her hind legs and it didn't give such a clear result.

However, I did my own little palpation which taught me something similar, in a different way. Fascia is the stuff that looks like plastic wrap that covers the muscles. I knew that there were fascial connections that took part in the chain providing a connection between the horse's mouth and the hind legs.

Up till that point, I'd thought of fascia as just the covering between muscles – packaging, I suppose. I didn't really think of it as having that much effect on movement.

At one point, the area around the stifle was being uncovered so we could see, and palpate, how the stay apparatus in the legs worked, to allow the horse to snooze standing up (which is really cool, by the way. You slip this little sling-like arrangement over the stifle, and none of the joints lower than this in the hind leg will flex, no matter if you get the strongest person in the room to try and move the leg. You can slip this little sling off the stifle with a light flick of your finger – and then all the joints in the hind leg operate freely again).

But anyway, while the dissection was in that region, a thick, heavy band of fascia was exposed in the low flank in the vicinity of the stifle, and we were invited to feel how very strong it was. Although mostly clear, it had the strength of leather. While a number of the group were palpating the fascia with strong traction, I was at the head of the horse, waiting my turn. Out of interest, I put a finger inside the horse's mouth, in the location a bit would ordinarily sit. There, I could clearly feel the tongue responding a fraction as the fascia below the stifle was pulled and released. The tongue would slightly quiver in response, moving in relation to the surrounding tissues of the lips. Wow – the tongue and fascia at the hind end were connected, in a way I could clearly feel! It was not an airy-fairy connection of energy or feelings – it was a real connection that travelled through the body, a mechanical linkage.

This confirmed for me once more the strong connection between the horse's mouth and the hind leg. This is a good reason to work on relaxing the horse's mouth and not cause discomfort in this area by pulling hands or tight nosebands: it really will affect the working of the hind end. For all those people who focus their thinking on the importance of the back end: don't forget there's a real chain of tissues from mouth to the hind leg. Interference at the mouth can decrease the functionality and range of motion of the hind legs, because they're linked.

Lessons From a Dissection – part 3 - The Horse Has No Collarbone

Of course, it is commonly understood that the horse has no collarbone. In fact, his front legs do not have a bony attachment to his torso. I remember the first time I understood one of the ramifications of this – I overheard someone at a horse show who wanted to get her horse into a height class, which the horse was ever-so-slightly short for. "It will be OK," the owner said to her friend, "I'll just make sure to get him a bit excited before the official measurement, and he'll be tall enough." Later, I mentioned this overheard snippet to a friend. She laughed and said, "I had the opposite problem, once. I had a horse I wanted in the shorter height class – which he could make if he was really calm. He'd make the height if I let him graze for 10 minutes before measurement!" These anecdotes tell of one ramification of the horse having no collarbone: without a bony attachment of the forelegs to the body, his height at the wither is somewhat variable.

In this year's dissection I was really fascinated with the differences between how the forelegs and hindlegs attach to the horse's body. This year, for the first time, the dissection was a standing one. The mare was held up by a frame, so that she appeared to be standing in a natural position. (Which utterly freaked me out on the first day, when I walked into the area and saw a horse apparently standing very calmly in position.) The standing position gave many opportunities to palpate the natural range of movement, or compare one side with the other. The focus of the dissection at first was with the forelegs, and there was a particular focus on ligaments and tendons, as the musculature was removed. There simply came a point where the muscles were removed and... the foreleg in question lifted off. I found this surprising – I guess despite knowing that their shoulders were different to ours, somehow I still expected a socket attachment, or something similar.

The next really surprising thing was to see the shape of the horse in the front, when the second foreleg was removed. You know how a horse's chest looks quite boxy when viewed from the front? It is the strong and substantial musculature of the shoulders, chest and neck that gives the horse this rectangular appearance when viewed head-on. But with this musculature removed, the sternum of the ribcage comes to a point, rather than being rounded. Without the front legs attached, the impression on viewing the horse's ribcage from the front is of looking at the front end of a ship: with the sternum being the prow, and the ribs then sweeping out wider to the belly, as the main body of the ship.

In comparison, the attachment of the hind legs to the body was completely different. As the dissection continued on to the hind legs, muscles were removed one by one, and we got to know the ligaments and tendons of the hind leg. The connection of the hind legs to the pelvis via the hip joint was substantial. With nearly all the muscles stripped away, and only the joints, ligaments and tendons in place, we could palpate the hind leg and it still had the natural range of movement you'd expect (I mentioned in Part 2 that the mare had poor range of movement behind. This freed up as the muscles and fascia were stripped away. Whether or not this had to do with rigour mortis or if it was because she had poor range of movement in life, I forgot to ask. Sorry!) We could move the hind leg in under the body, and away from the body as if doing lateral movements, and these movements were allowed by the rotation of the top of the leg in the strong hip socket. Because each hind leg kept its attachment to the bony structure of the pelvis, you could see that the horse wasn't really in a position to change its height in the back end, if standing normally.

Since doing the dissection, I've been thinking a lot about the differences between how the front legs attach, compared to the hind legs, and what this means for the ridden horse. Forgive me if I'm not terribly scientific here – I'm trying to synthesise my recent anatomy knowledge, with what I know about riding. Here goes:

The front legs attach to the horse's body with pliable, flexible, complex muscle groupings. These form a sling around that pointy sternum, wrapping tightly around it, holding it up and carrying it. The connections of the forelegs, shoulders and neck are achieved through soft tissue: a complex strapping including muscles, tendons, fascia and who-knows-what. Muscle has a fundamental part to play in what the forehand can do, and muscle is very adaptive stuff. It can change substantially according to factors like exercise, stretching, nutrition, injury, habit, pain, crookedness and the emotional state of the horse. It can be different on one side to the other. The adduction and abduction of the forelegs (think lateral movements) are achieved via those muscles, as is the horse's height at the wither. At any moment, the action of the forehand is a symphony of soft tissues working together to hold up the entire front end of the horse – and the front end is heavier than the back end.

We all know that it's not very pleasant to ride a horse that's on the forehand. A lot of dressage people will talk about raising the forehand by getting the horse to step under more with the hind legs, lowering the hips and tucking the pelvis, so that the forehand can lift up - like a crane, I suppose. So I was interested to look at the muscles deep in the pelvis that were in a position to do this. As far as I could see, the main muscle groups that were in a position to leverage the forehand up had to be the ones attaching the pelvis to the vertebrae of the back at the top (muscles like the iliopsoas), and to the abdomen, at the bottom (such as the rectus abdominis). The thing that really struck me is that the muscle groups that appeared to be in a position to allow the hind end to raise the front end were relatively small and slender. They were in no way comparable to the strong and substantial muscling at the front of the horse that attached the front legs. Forgive my non-scientific guesstimate, but I'd say they were considerably less than one-tenth the size.

I'm not saying that the ability of the hind end to provide lift to the forehand isn't important - it is, and in a horse in a superb piaffe, you can clearly see the hind end lowering and the pelvis tilting, to assist in the raising of the forehand. But a simple size comparison suggests that the muscle groupings in the top and bottom of the pelvis are not able to lift that heavy forehand by themselves, nor – located in the back end of the horse – are they in the best position to do so. What is strong enough, and best positioned to lift the heavy muscles of the forehand? The heavy muscles of the forehand – that's why they're there!

If I can summarise the matter brutally, I thought that the difference in how the hind legs and front legs attach to the horse spoke to their main roles: the hind legs - attached deep within the bony structure of the horse - push the body forward. The front legs, held on by a complex sling of muscles, lift the front end of the body up.

I so frequently hear riding advice that is phrased in relation to riding the back end of the horse, which at the same time absolutely bans the rider from doing anything to directly influence the front end. On rare occasions, I have seen this sort of advice result in a wonderfully balanced lift to the forehand – but more often than not, I just see the horse being pushed more and more onto the forehand. Now that I've seen the musculature involved and the way the horse's legs are attached, I can see why - the horse doesn't have that much structure in the back end that can assist him with lifting the heavy front end, and it is relatively weak and far away.

Interestingly, the rider's hand is positioned right above the strong and substantial muscling of the forehand, and is rather well placed to assist in helping the horse learn to lift the area, and over time become strong enough to stay lifted there. Further, if the rider can work intelligently with the forehand, there is a lot of scope to work with the pliable and adaptive muscles there, to improve crookedness, lift, flexibility, range of motion and strength. Perhaps more scope than available in the hind end, which has a non-negotiable attachment of hind leg to the pelvis. Anyway, those are my current musings on the matter - I hope you found them interesting. Next week is the final chapter in relation to the dissection.

Lessons From a Dissection – part 4 - The End Of The Line

I have chosen to pursue a school of riding where we very carefully try to expand on the horse's capabilities; making the horse strong and hopefully able to have a long and healthy working life. I did this because a healthy, happy horse that is a long-term partner is what really appeals to me. I also have aspirations to continue to improve my training and ride high-level dressage movements. As I'm not blessed with enormous talent, (and I don't believe in quick fixes anyway), I'm very interested in keeping my horses sound for a long time, so I can continue to work on our partnership for many, many years to come. But despite our best attempts, good training cannot provide everything. On the rare occasions when I am selecting a new horse, I want to choose one that has been physically endowed with a body which gives us both the best chance of that long life.

There are a lot of different horse breeders. Some breeding enterprises, such as for the racing or the warmblood breeding industry, can breed a large volume of horses for the market. It can be like a big supply chain feeding various sorts of consumers: including racing, the more serious competitive sport horse types, or the enthusiastic amateur or weekend rider. If, like me, you are an enthusiast who ends up buying a horse to keep pretty much forever rather than training them to sell them on, then you are the end of the line. Both in the sense that you are the final consumer, but also in taking on absolute responsibility for every aspect of the horse's life. What I learnt about our dissection horse in the final day spoke to me about our wider responsibility to step up and do what we can to influence the situation where we can see that the breeding of horses is going badly wrong. There are forces afoot which mean that a fair percentage of the horses bred will NOT have a happy, long or sound life. This was the case for our poor dissection mare.

On the final day of the dissection, we discovered that she had a really severe problem - the C6-C7 malformation in her neck vertebrae that you may have heard about. (See here for more info: <https://thehorsesback.com/c6-c7-malformation/>) The results for her were catastrophic. Sharon May-Davis, who was performing the dissection, said that this was the mare's primary problem, that drove all the other damage she had in her body. As a result of the malformation, the mare most likely had poor proprioception in her front end and was heavy on the forehand and low in the base of the neck. In the forelegs, the damage caused by this included very severe arthritis in her elbow joints, and lesions around both front navicular bones. As if this weren't enough, the hind end also had severe damage relating to the entire body being out of balance (Sharon mentioned that these horses try to address their forehand issues with their hindquarters, resulting in the hind end taking up a heavy job it was not designed to do).

The mare had severe arthritis in her hips, stifle and hind fetlock joints. When the legs were disarticulated, we could all feel the grooves and lesions on the cartilage which caps the wearing surface of the joints, which was supposed to be smooth. It was sobering. She was only 6 years old.

The malformation caused her unsoundness, and also the out-of-the-blue behavioural problems. A farrier was there who had cared for the horse's feet for some time. He said she was like Jekyll and Hyde – some days he'd come and she'd be sweet, calm and obliging, lifting her feet and doing everything he requested. And other days, she'd be tense – snatching her feet back and being fearful and anxious, and liable to explode. He never knew which one she was going to be, except over time she was more often worse.

When it became clear that this mare had the C6-C7 malformation, numerous people asked Sharon, "What can be done for these horses?" Sharon said that the average age that she sees these horses – on her table - is 11 years old. By this time, for a badly affected horse, the physical or behavioural problems which arise because of the malformation are generally so severe that the horse has to be put down. Other people told tales of horses that they knew with the malformation for which attempts had been made to keep them at least paddock sound, but it only lasted so long before the horse was miserable and clearly in pain. The malformation is genetic. It causes problems such as asymmetry, instability, and osteoarthritis – and it can result in a horse that will often 'just suddenly' behave explosively. It depends on how bad the malformation is for the specific horse, but Sharon was saying that arthritis starts at 4 years old and worsens from there. The thing I find utterly unbelievable is that she reports that she's seeing 30-40% of some breeds with this malformation – particularly TBs and warmbloods. Now, perhaps this is over-reported because there will be a strong tendency for horses with severe problems to end up being dissected. But I find it shocking that so far there hasn't been a concerted effort from breeders to avoid breeding horses with this problem. But I guess it makes sense: if these horses typically don't start getting problems until they're 4 years old, the horse has left the breeder's care before any problems show up. Just consider the racing industry - the horse's racing career is most likely over by then. And in any case, the aim was for the horse to win races, not to have a long, healthy life.

What can we do? Nothing really, for the horses that were unlucky enough to get the genes that result in the malformation. But I know that, for myself, if I am ever looking to purchase another horse, I will get the radiographs done that will show up this malformation. Apparently my usual vet does it for \$260 – well worth the money, given the high proportion of horses with the problem and the severity of the problem for both the horse and for the rider, if they have it. These horses are more prone to breaking down catastrophically at high speeds – think galloping, jumping, eventing. This problem can end the horse's life, and it can take out the rider, as well. (This link takes you to a paper by Sharon May-Davis on how the malformation can be detected in radiographs: <https://thehorsesback.com/c6-xray/>)

If a high proportion of people start asking for radiographs of horses as part of the pre-purchase vet check, it will send a message to breeders that this is an issue which they have to care about (at least for warmbloods, but I don't know what we can do about the racing industry, which provides the leisure rider sector with so many of their horses). Even if you are offered an ex-racehorse for free, you could still do the radiographs. You could be saving yourself a lot of heartbreak. Also, if I am ever in the position to be breeding my own foal, I will definitely be placing a high emphasis on the sire and dam having had a long ridden career, or at least coming from lines where longevity of use was a factor. I'll be very suspicious of the sire or dam retiring early for breeding purposes. If the phrase "paddock accident" is used as a reason for the horse not ever having been ridden, I'd want to see the scars!

And one final point. The owner of the dissection horse had done absolutely the right thing in deciding to end the mare's life. She had stepped up to provide the horse with a caring option – and one which may help to spread knowledge of this serious problem. Will this help to turn the situation around and result in a decrease in the number of horses being bred that have this problem? That may well rest in YOUR hands. Because you are the end of the line.