

Negative Palmar Angle Syndrome – Dr Kate Meiring BVSc



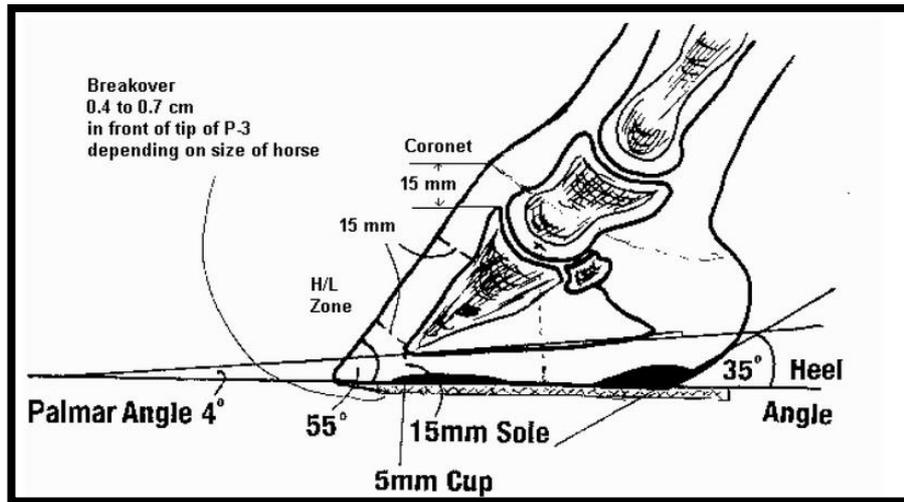
I think that the start to any discussion on feet involves putting into perspective their importance. Horses are 4 legged animals and they carry 60% of their weight on their front legs. They do not have an articulation joint between the front legs and the body. You can imagine that you carry your weight on your legs and distribute this weight through your hip joints. Horses have a muscular sling made up by the superficial and deep pectoral muscles that distribute this weight to their front legs. The back end of the horse is responsible for propulsion and the front end is responsible for steering and carrying the majority of the weight.

When we look at the proportion of lameness's we see in horses, more often than not they are lame in front and of those front limb lameness's, 80% of the time the problem is below the carpus ("knee").

The reason we spend so much time and energy discussing feet, chatting to farriers and trying to perfect our shoeing is because the hoof is the most common cause of horses being off work and it is a dynamic structure. It changes through the seasons and it changes in response to diet, environment and shoeing techniques.

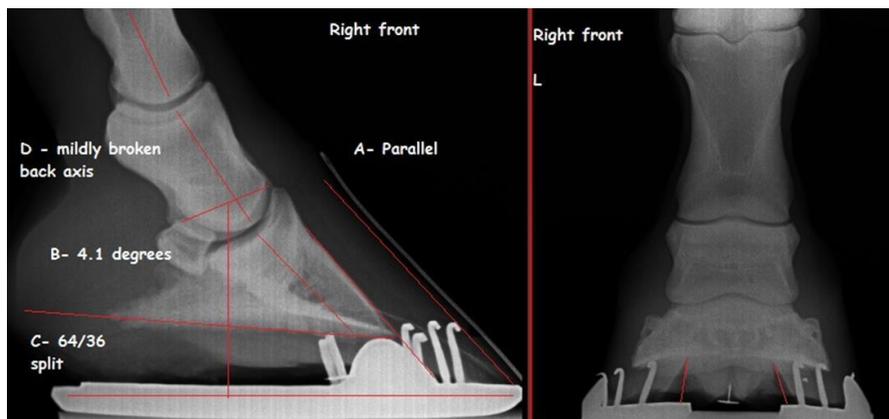
At this point I want to do a brief overview of the anatomy of the hoof:

This is a diagrammatic representation of what the angles on a radiograph should look like. The pedal bone is suspended by the lamellae within the hoof capsule. The digital cushion at the base of the pedal bone provides the shock absorbing function to the hoof.



The hoof is a highly evolved and very complex structure. The most common cause of lameness in spring is normally sole bruising and hoof abscessation. Horses can either bruise through pressure being applied from the outside of the sole, for example they will play around in the paddock and stand on a stone, land a little awkwardly after a jump or get a bit of sole pressure from a shoe. The hoof can also get pressure being applied from the inside of the hoof capsule, where the angle between the pedal bone and the ground is so narrow that it pinches the sole, resulting in deep seated corns. Basically, bruising of the sole is like any tissue that becomes bruised, the tissue becomes damaged, and blood and inflammatory mediators are found in the area of damage. These mediators are responsible for the pain we see on hoof testers and lameness under saddle. Often, they can be worse in the soft going as the sand moulds into the shoe and applies more pressure to an already sensitive sole. This bruising creates a marvellous environment for secondary bacterial infection. If there is standing water and mud in the horse's environment, like during our Cape winters, then often bruising will develop into a hoof abscess.

Some horses appear to be more susceptible to hoof problems than others. This is normally when we start to suspect that the conformation of the pedal bone within the hoof may well be the cause of the problem. We did a hoof survey towards the end of 2010 and were surprised to find that a large proportion of horses had what we call negative angles, or Negative Palmar Angle Syndrome. We did do the survey after a long, wet winter. We feel that these angles tend to deteriorate over winter. The hoof tissues remain damp for extended periods of time, and this may be the cause of the sinking of the heels. The rate of hoof growth in winter may also play a role. Sometimes negative angles can be suspected clinically. If you have a typical long toe low heel conformation, it is likely that negative angles will be found on radiographs. The only way to really determine the degree of the angle is to measure this radiographically.



This is a radiograph of a fairly normal foot. If you compare this to the diagrammatic representation you will note that the palmar angle, the angle between the base of the pedal bone and the shoe is fairly normal. The following radiograph shows what the anatomy looks like when the angle is negative.



I think the biggest problem with this condition is that due to the complexity of the anatomy of the hoof, horses can live with a certain degree of irregularity and show very little lameness. However, when the condition has been there for a long time, the impact that it has on other structures, like the deep flexor tendon, the navicular bone, the coffin

joint and the collateral ligaments is irreversible. These structures do not heal well. They have limited blood supply and are difficult to rest because they have such an important job to do. The negative angles also further crush the existing blood supply. They are also relatively inaccessible from a treatment and diagnostic perspective. They are difficult to block individually, and the soft tissues are almost impossible to visualise with anything other than an MRI. Once you have a problem within the hoof, the impact on the performance of the horse is frustrating, they have good and bad days, they normally go lame just before major competitions and the owner often doesn't know exactly what the problem is.



The image above shows the impact of the negative angles on the digital cushion. The digital cushion is healthy and providing a shock absorption function on the right. The foot on the left shows an atrophied digital cushion with compression of the blood supply to the pedal bone and surrounding structures.

We mentioned earlier that the front limbs carry 60% of the horse's body weight. Even if they have a small amount of discomfort coming from their front feet, they will then throw their weight backwards and show other more subtle signs of lameness. Sore backs, reluctance to move forward, stopping or jumping to a certain side during lessons and gluteal pain. Primary back injury is seldom the cause of back pain; it normally originates from irregular weight distribution. It is important to rule out back injury, but often, you find the problem in the front feet.

Treatment

Treatment involves early identification of the problem and addressing management issues that may be contributing to the problem. Removing the shoes, putting horses onto hoof growth supplements and leaving them off for approximately 3 months help with improving hoof growth and giving the farriers something to work with to help improve marked negative angles. In extreme cases we can medicate the navicular bursae. It does seem to help with pain relief of the soft tissue structures that can be impacted by the negative angles and buy time for the farriers to address the dynamics of the hoof.

Management issues to watch out for:

- Overzealous trimming, are the trimming cycles too short?
- Trim hoof to horse, don't try to get the perfect looking foot by compromising the mass of the hoof.
- Excessive moisture. Keep horses in and out of the mud during very wet days.
- Lack of exercise, the frog needs to be stimulated to help pump blood around the foot and stimulate hoof growth.

CAPE VETERINARY EQUINE PRACTICE

Cape Veterinary Equine Practice
Shop 6, Park and shop Centre, Firgrove Avenue,
Meadowridge, Cape Town, 7806

capevet@telkomsa.net
www.capevet.net
Tel: 021 712 2290

Company Reg: 2013/155992/07

- Unruly or difficult to handle horses are a challenge to shoe properly. Spend time on the ground training your horses to be obedient and to lift their feet for the farrier.

Farriery

The links below provide some interesting insights and advice by farriers with regards to facing the challenge of corrective Negative Palmar Angle Syndrome.

<http://www.thehorse.com/articles/26366/low-heels-in-horses-new-grading-system-and-targeted-treatment>

<http://blog.easycareinc.com/blog/insights-from-the-inside/dont-be-negative>

<https://www.equipodiatry.com/news/articles/articlepalmarpain4htm>

A few key pointers to take home are:

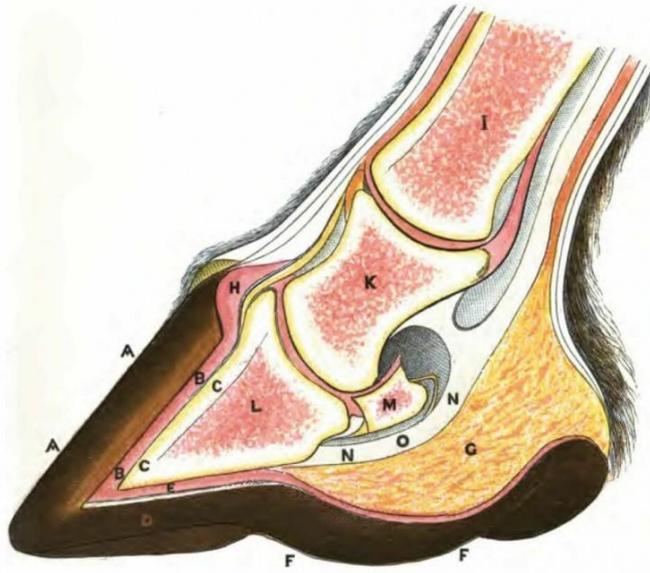
- Mass is more important than balance
- 3-4 shoeing's to get a mild grade back on the right path
- Remove only what the foot does not need and leave everything that it does need.
- Maintain the relationship between sole depth and palmar angle.

Conclusion

The impact of the future soundness of your horse depends on you knowing what you have so that you can deal with it appropriately. Annual radiographs will help to provide both you and your farrier with the information you need to address these problems early and make sure that the long-term damage to the navicular, the deep flexor tendon and the digital cushion are minimised.

Appendix A

SECTION OF A FOOT.



- | | |
|--------------------------|-------------------------------|
| A.A. CRUST OR WALL. | H. CORONARY BAND. |
| B.B. INSENSITIVE LAMINÆ. | I. LARGE PASTERN BONE. |
| C.C. SENSITIVE LAMINÆ. | K. SMALL PASTERN BONE. |
| D. INSENSITIVE SOLE. | L. COFFIN BONE. |
| E. SENSITIVE SOLE. | M. NAVICULAR BONE. |
| F.F. INSENSITIVE FROG. | N.N. FLEXOR PERFORANS TENDON. |
| G. SENSITIVE FROG. | O. SEAT OF NAVICULAR DISEASE. |