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Contracted heels

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The solar surface of the healthy normal foot is recognised to be reasonably symmetrical, fairly round in the front foot and slightly narrower and more pointed in the hind foot (Figure 1).

Figure 1: Good examples of healthy front and hind feet. Showing symmetry and strong heels, with functioning frogs.

The healthy foot can be divided into four quarters which have a similar surface area, a strong frog and the heels are in line with the ‘toe pillars’ or the position that the toe nails would be placed in the shod foot (Figure 2).

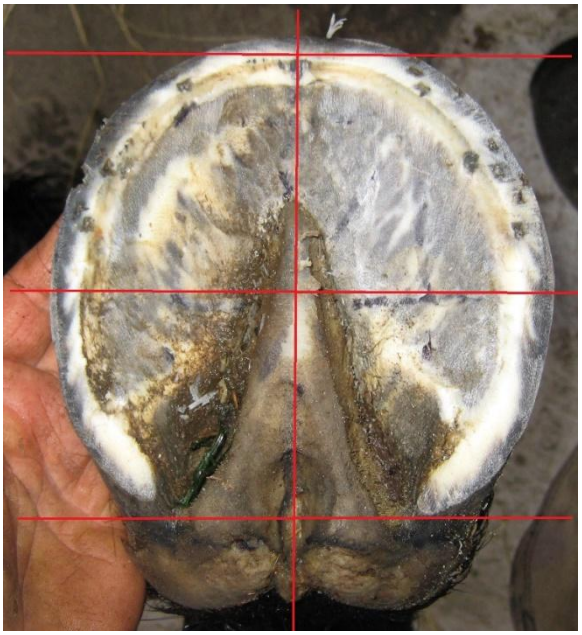

Figure 2: A healthy foot showing four quarters with equal bearing surface.

In a foot with contracted heels the foot when divided as before will have less surface area in the heel region, the heels will be much closer together and the frog will be atrophied. Contracted heels have been defined as a ratio of the frog length to frog width. When the frog width is less than two-thirds the frog length, the condition is called contracted heels (Turner, 2006)(Figure 3).

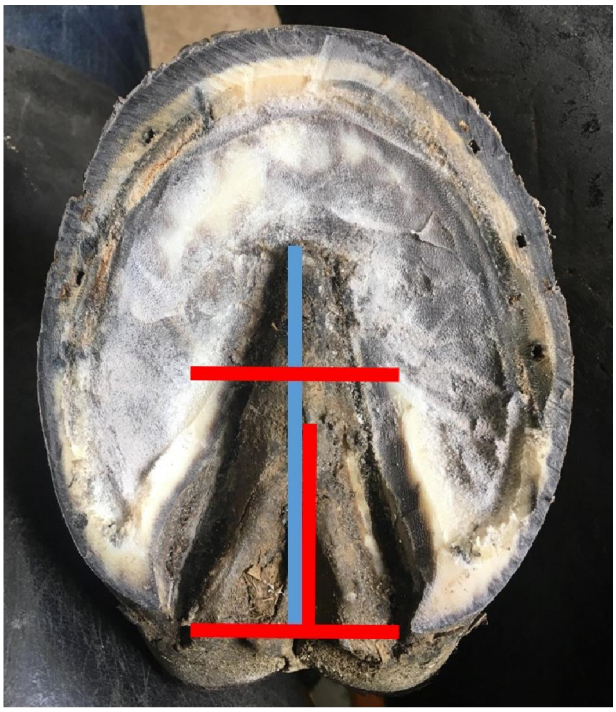

Figure 3. Contracted heels are defined when the width of the frog is less than 2/3rds of the length of the frog (red parallel lines are 2/3rds the length of the frog – blue line.) Red vertical line is equal to the width.

The sole may have become more concave as the foot appears to become more tube like than the normal cone shape. From the lateral view the foot with contracted heels will appear more upright, with possibly a greater heel depth although it should still have a straight Hoof pastern axis as opposed to a club foot where the HPA is broken forwards (Figure 4).

Figure 4: Contracted heels appear more upright than normal although the HPA is straight.

Contracted heels can occur in front or hind feet and may affect a single foot or a pair or any combination depending on the cause. A foot with contracted heels will have a reduced ability to expand and return, this reduces the ability of the shock absorbing anatomy – primarily the frog & digital cushion - to absorb energy and it transfers directly to the horny hoof wall.

Growth patterns in a foot with contracted heels should still be relatively even, rather than in a club foot where there may be excessive heel growth or in collapsed heels where any growth is crushed or worn away leaving only the toe area to be trimmed. If contracture is so severe that the ground surface of the wall at the heels is narrower than at the coronary band the pressure on the soft tissue and laminae in that region can create lameness (Figure 5).

Figure 5: A foot bearing surface that is narrower than the coronary band creates excess pressure at the hairline and may cause lameness

A foot with contracted heels that has poor medial/lateral balance is very prone to developing sheared heels due to increased shock unevenly distributed through the wall.

Horses with contracted heels may be prone to heel first landing, particularly if not trimmed properly, this will affect the stride pattern with a more ‘choppy’ upright stride seen which further increases the concussion in the heel region.

In a horse that is seen to develop contracted heels the cause should be questioned. It may be a sign of chronic lameness e.g. Navicular disease or an acute lameness such as a limb injury.

There are various reasons a horse may have contracted heels in a pair of limbs – most likely the fore feet. They may have a very upright conformation that predisposes them to the condition if appropriate foot care, foot management or environment is not maintained.

A young animal that is growing too rapidly may develop a very upright conformation, it may not go as far as a flexural limb deformity such as ballerina syndrome or tendon contracture but will leave it prone to heel contracture without careful farriery.

A hoof needs stimulation (movement) and a degree of moisture to function and flex. A foot that is overgrown, has lack of frog pressure or is kept in an environment where the feet are very dry (e.g stabled on rubber mats, exercised on synthetic surfaces and not turned out) will function less well (Figure 6). This situation combined with upright conformation is likely to result in heels and feet contracting. Due to their natural environment some breeds are prone to contracted heels such as the Spanish breeds that have hard ‘boxy’ feet (Curtis, 2006).

Figure 6: An overgrown or under trimmed foot combined with very dry environment has resulted in contracted heels.

Pain is a common reason that a horse may develop contracted heels. If a horse suffers caudal hoof pain, or pain in the navicular region, loading the heels becomes painful and the horse shifts its weight towards the toe and unloads the heels. This lack of loading will create a contracture if the pain is not managed. There is a ‘tendency of some horses with long standing navicular disease to develop boxy, upright feet. ‘Some horses that are attempting to unload their heels by DDF muscle contraction are presumably sufficiently successful that they will develop contracted heels and an upright foot.’ (Wilson, 2001) This situation could occur in one or more feet – most likely front feet due to the greater weight carried by the forelimbs.

A collateral sidebone where both sides of the foot are restricted can create a foot with contracted heels – these feet cannot expand so the heels will not be able to return to ‘normal’ once contracted (Figure 7).

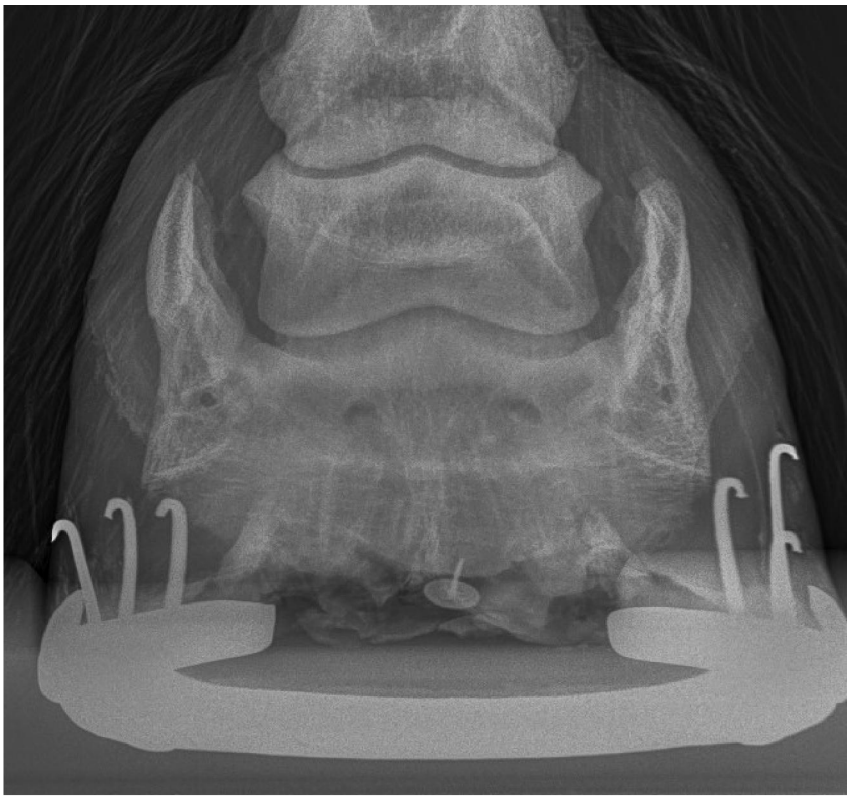

Figure 7: The author observed a steady contraction of this highland pony foot as the collateral sidebone progressed. The wall became more upright with stress fractures appearing near the coronary band on both heels.

If a single foot has contracted heels it is more likely be due to a period of time where the limb flight was altered to reduce loading on the heels or the flexural soft tissue (tendon injury) (Wilson, 2001) or completely unloaded due to a trauma such as a pedal bone fracture (Figure 8).

Figure 8. A trauma such as this pedal bone fracture can cause the horse to off load the affected limb resulting in contracture of the heels and entire foot.

Poor hoof care resulting in infections such as thrush can create sufficient discomfort for the horse to stop loading the frog and therefore heels, resulting in contracted heels.

Trimming and shoeing methods should always encourage normal hoof function and any change to this may alter the loading of the frog and foot resulting in a contracture in the heels – although less likely to be seen now, horses consistently shod with caulks may have developed contracted heels due to lack of frog pressure. (J Hickman, 1988).

Incorrect trimming can create contracted heels and leaving excess heel places greater pressure down the front of p3 onto its tip potentially damaging solar corium, laminae and the bone itself (Figure 9).

Figure 9. Remodelling to the tip of P3 -the result of under trimming this is the same foot as in figure 6.

There has been discussion into the effects of limb length disparity but the author found no direct research backing theories that a short limb may have a contracted foot.

There has been a development in the types of materials used to shoe horses and there is always advantages and disadvantages to each. The increasing use of plastics and acrylics have allowed shoes to be applied in a way and in areas of the hoof wall where nails are not traditionally placed, this can be contra-indicative to normal hoof function. ‘It is possible that the glued shoeing induces the contracted heels by interfering with the hoof mechanics’ (Yoshihara, 2010).

When dealing with any hoof problem the first aim should be to remove the causative factor. In the cases where the cause is temporary and treatable for example - poor trimming, shoeing methods or thrush - the feet should be able to return to a functioning healthy state although it will be a gradual process. When the cause is long standing e.g. conformation, or navicular pain, the treatment and recovery will vary. If the cause cannot be removed then the foot is unlikely to recover to normal.

When the cause is mechanical then the foot/feet should be assessed and trimmed/shod according to the individual conformation. Trying to lower contracted heels in an animal with very upright conformation in an attempt to force function will create a broken back hoof pastern axis and probably pain in the supportive soft tissue. Hoof function in these cases may be improved by trimming the heels down further but the foot should then be wedged back up with some frog pressure to realign the bone column and take the overload off the soft tissue (Figure 10).

Figure 10. This horse suffered from collapsed heels but this shows the principles of trimming the heels back to a functioning position and then using a wedge to realign the HPA and relieve pressure on the deep digital flexor tendon.

If pain is the initial cause of the contracture and it can be controlled then normal hoof function should be recoverable although if the change has been present for a substantial time then the foot may not respond. For example in a pedal bone fracture where the broken foot will have contracted it may always show a slightly more contracted foot (Figure 11).

Figure 11. This foot suffered a pedal bone fracture and the foot was seen to contract over the treatment period although the bone fracture had knitted the hoof capsule may not recover from these changes.

In cases where a limb is unloaded for a period of time not only should the function of that foot be of concern but the opposite limb must be given additional support as it is overloaded – the effects on the loaded limb can range from hoof deformation leaving a bigger flatter foot through to complete mechanical breakdown - laminitis.

In the case of DDFT injuries the use of raised heels or patten bar shoes can create contracted heels if left on too long – that and the healing of the tendon should occur with some degree of loading.

There is now a wide range of modern hoof packing and pads which allow the farrier to support or load any part of the solar surface and frog that they wish. (Colles, 1989) This allows them to influence the mechanics of the foot without adding weight to the horses' limb. Depending on the cause some feet will recover well with the shoes removed and normal function stimulated with good ground conditions and stimulus through movement.

There are some advocates of grooving contracted heels to effectively weaken them and encourage them to move but the author prefers to create frog pressure rather than weaken a hoof capsule.

There are some historical references from the 1800's to hoof springs or shoes designed to force the heels open (Dollar, 1993) and suggestions that thinning the toe to weaken it will help but in the authors opinion good hoof function is not achieved through over rasping feet and you will not produce results without creating correction function (Figure 12).

Figure 12. A version of shoe designed to 'force' the heels open. Circa 1800's. With kind permission of Mr D.Bradbury MBE FWCF, Clay Cross farriery museum.

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