One Farrier's Viewpoint

Hoof Capsule Distortion As A Process Rather Than An Event

Veteran farrier looks at hooves from a different viewpoint

Martin Kenny, an experienced farrier from Carthage, N.C., believes that many traditional ideas about correcting hoof capsule distortion actually lead to further problems.

By Martin D. Kenny, CJF, RJF

For too long, the horse industry — and specifically farriers and equine veterinarians — have looked at hoof capsule distortion (HCD) as an event that can simply be altered with a rasp, wedge pads, clips, bar shoes, etc.

The fact is that HCD is the culmination of many things occurring within the foot. We will look at the progression of such an event, as well as some of the causes.

To look at HCD, we will first describe the hoof we all want to achieve, and then discuss how that hoof instead develops flared quarters, a dished toe and heels that appear to be underrun.

Whenever possible, we will use photos that were taken before shoeing. The only true way to truly judge a farrier's work is to see how it looks a month after the horse has been shod. All hooves should look good when they are freshly shod, but time will tell us if we have them reasonably close to being correct.

On the foot we are all aiming for, the toe and quarters will have no (or limited) flares (**Figure 1**).

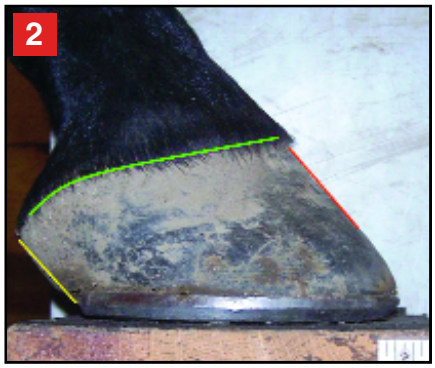
Flares indicate stress that is creating a lateral movement of the hoof capsule that the structure was not designed to accept.

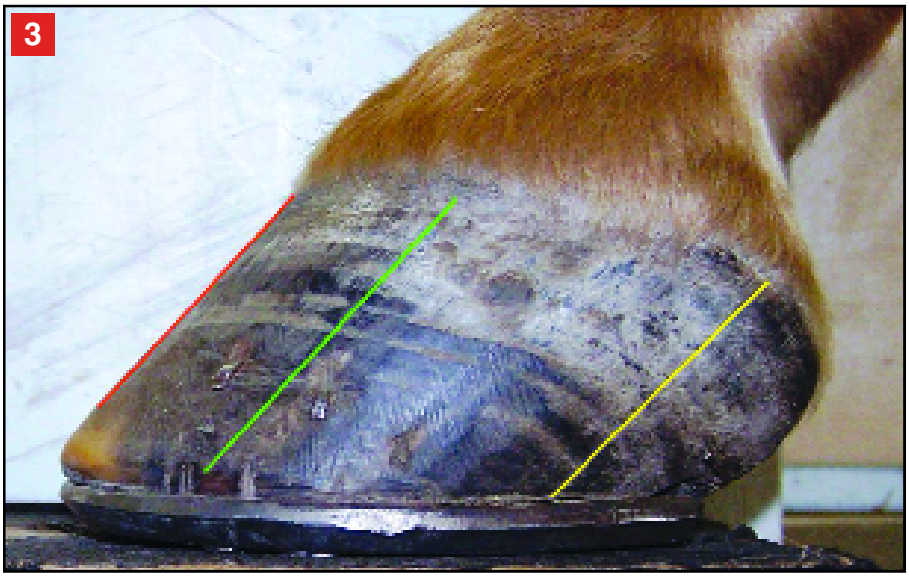
The heel angle (HA — yellow line in **Figure 2**) should be approximately the same angle as the toe angle (TA — red line) and the hairline (green line) should have limited deviations.

First In A Series

Next Up: A look at how the placement of nails affects the displacement of the horn tubules and data that shows traditional nail placement actually creates long toes.

Conclusion: A look at the bearing surface of the shoe itself and the effect that aspect of shoeing has on





Horn Tubule Angles

More importantly (and often overlooked), the horn tubules in the quarters should have relatively the same angles (Quarter Tubule Angles or QTA — green line, **Figure 3**) as that of the heel (HA — yellow line that follows an individual tubule) and toe (TA — red line).

Note that I do not measure the end of the heel region, as that will not provide an accurate measurement due to the curvature of the heel. I measure the angle of the tubule just ahead of where the heel region begins to bend inward. This provides a much more accurate point of reference. Also when measuring the TA, I only measure the top portion down to where any deviation occurs, as that is the true angle of the toe.

The View From Beneath

From the underside (**Figure 4**) we should see bars without (or with limited) bends. The frog should be healthy with no (or limited) bends or tears. There should be equal amounts of foot to either side of frog and no more than 1/3 of the foot ahead of the center of rotation (Duckett's Dot). The heel of the hoof capsule should end at the widest portion of (the non-distorted) frog, which should show no (or limited) deviation from vertical development at the extreme posterior. The angle of concavity should be equal on the medial vs. the lateral side of sole and bar region.

When the foot is trimmed, there should be no signs of overlapping tissues at the bar/frog junction or at bar/sole junction, as the overlapping tissues will greatly inhibit the free movement of other structures. For example, a frog that overlaps the bars will inhibit the lateral/horizontal movement of the bars due to vertical pressure being created by the overlapping frog tissue.

Flares are a sign of improper loading…

Progression Of The Problem

Now let's consider these descriptions as we look at the progression of HCD.

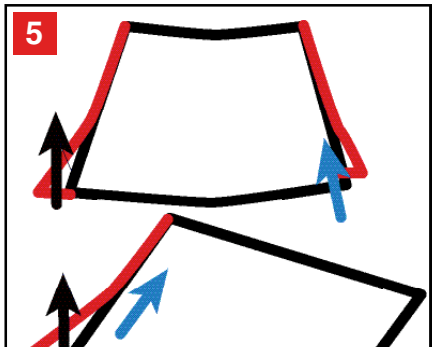
When you return for your next shoeing, it is imperative that the hoof capsule still be free of flares. Flares are a plain and simple sign of improper loading. In **Figure 5**, the red lines indicate flares. These can only be created by the stretching and tearing of horn tubules. When you get enough stretching, the laminae cannot take the strain and begin to separate. The quarters will weaken and crumble, causing raised clinches as the horn wears away against the shoe.

In 100% of cases I have seen, I have found that when I reverse the detrimental loading issues, this localized separation simply grows out without further concern, leaving a foot that will grow without nail clinches becoming loose, cracking or chipping.

This gives us "overrun," rather than "underrun" heels…

In a flared foot, the energy of loading will dissipate obliquely across the horn tubules (black arrows) instead of being transferred along the tubules (blue arrows). In order for the hoof capsule to properly absorb concussion and perform the task of loading, storing energy and finally releasing energy, it is imperative that the lines of force follow tubules and not travel obliquely across them.

In the quarters, the improper loading of tubules is magnified when the horse makes a turn. In the case of the toe tubules, improper loading is magnified at the breakover stage.



Unrecognized Role

Now let's look at the quarter tubule angles (QTA). I believe these play a role that we have failed to recognize. **Figure 6** shows just how badly they can get out of alignment. Notice the hairline bend at the toe region, where the black, green and yellow lines intersect. This is a shear point within the hoof capsule.

You can easily see that the QTAs (red lines) are running at various angles in different portions of the hoof capsule. I used this model to further study these QTAs.

Using Metron computer software, we can put numbers to these marked QTAs (**Figure 7**). The same photo shows the angles in relation to the ground surface of the foot.

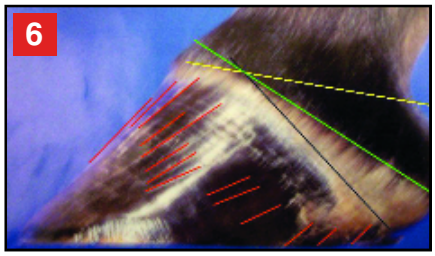
It becomes obvious that the energy the hoof is asked to absorb will be dissipated in no specific direction in a hoof such as this. I have grouped the numbers by color, as they form three specific groups. The QTAs at the toe and heel are in same group (blue) and there is a small area of QTAs just before the heel that corresponds to the group just behind the toe.

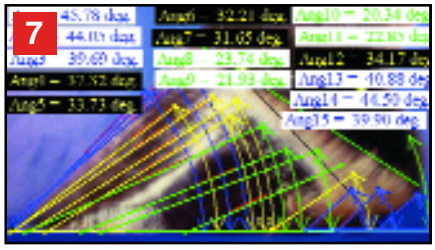
I believe that not fully understanding this aspect of hoof capsule distortion is one of the largest obstacles we face in reversing this condition.

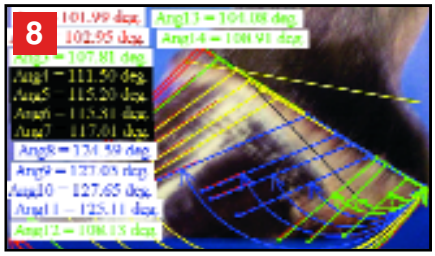
Now let's look at the numbers in relation to the hairline. The ground surface is in relation to the reaction that the hoof has with the surface it lands on, but we must also consider the reaction the hoof capsule has to weight coming down through it from the body mass.

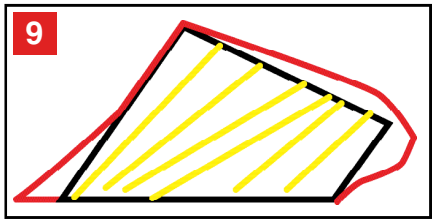
In **Figure 8**, I grouped the numbers in four specific groups to better understand the correlation to each. Using the hairline as my reference point and following the same tubules as in **Figure 7**, I have found that there is a small group of QTAs just behind the toe region that correlates to the heel region QTAs.

The type of QTA distortion in **Figures 6, 7 and 8** will only get worse with the approach we have been utilizing for decades.









Distortion Side Effects

How the QTA distortion will further affect the capsule in such areas as the hairline, bulbs and overall hoof shape is demonstrated in **Figure 9** (red lines).

We have been told that the heels migrate forward with the toe to produce long toe-low heel syndrome. That is not what happens at all. As shown in **Figure 9**, the hairline (red line) is driven rearward due to displacement from QTAs moving the hairline upward. The bulbs are then driven rearward and downward to produce the altered, lowered angle of the heel region. This gives us overrun rather than underrun heels.

Looking at the hoof capsule in this manner helps explain why simply adding a wedge or forging a bar shoe, will only alter the direction of strain, while doing nothing to reverse the problem.

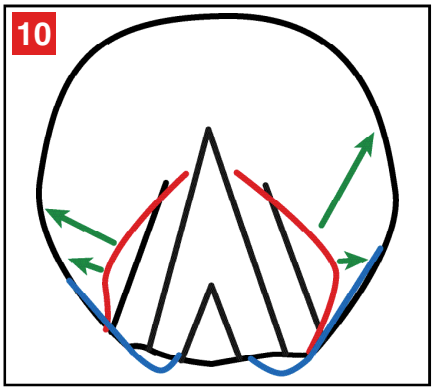
The foot must be loaded in a way that does not encourage uneven loading of the structures involved…

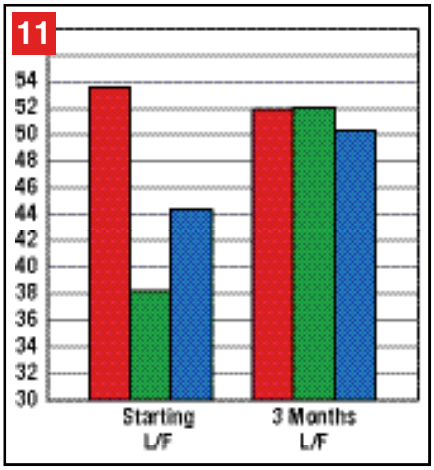
Where we have gone wrong in attempting to reverse hoof capsules is in trying to alter the form of the foot to change the function of the structure. It will never work. An axiom in architecture as well as design is that form follows function. We must assist the hoof capsule in reversing its misguided function. When we do that, the form will follow. That is the only way to reverse distorted hoof capsules without simply creating new distortions elsewhere.

When we look at the sole view of the hoof capsule (**Figure 4**), we can begin to see why the foot must be loaded in a manner that does not encourage uneven loading of the numerous structures involved. We must also fully understand the effect on internal structures.

When you look at the sole of the foot and see distortions (**Figure 10**) such as those represented by the blue and red lines, you can begin to understand that there is a correlation between these distortions and the QTA distortions we saw earlier. We must understand that medial and lateral QTAs will rarely be deviated the same, as show by the green arrows indicating the direction of energy movement.

The good news is that these feet can be returned to a state of dynamic equilibrium once we learn to fully understand the hoof capsule. The chart (**Figure 11**) shows how the toe angle (red), QTA (green) and heel angle (blue) can be brought back into balance with each other in only 3 months, once you fully understand the dynamics involved in the hoof capsule.





Martin Kenny is an American Farrier's Association Certified Journeyman Farrier and a Registered Journeyman Farrier with the Guild of Professional Horseshoers. He works from The Hoof Redevelopment Center in Carthage, N.C. For more on his ideas, contact him through his Web site, www.thehoofcenter.com or by calling (910) 947-9476.