

Long Toe - Under Run Heel

BY STEPHEN E. O'GRADY, DVM MRCVS

Long toe -under run heel foot configuration is one of the most important and common foot abnormalities facing the horse industry today. This type of foot conformation is so common that it is often thought to be within normal limits. The long toe-under run heel has been defined (by Turner) as occurring when the angle of the heel is 5 or more degrees lower than the angle of the toe. It is often accompanied by a broken-back hoof pastern axis, which means that the slope of the foot exceeds the slope of the pastern (Figure 1). This condition could also be referred to as a dorsopalmar imbalance of the foot.

This long toe-under run heel is of concern to both veterinarians and farriers. For veterinarians, this abnormal hoof conformation is known to contribute to many foot related problems such as navicular syndrome, chronic heel pain (bruising), DIP joint (coffin joint) synovitis, quarter and heel cracks, and interference problems. The farrier is confronted with the essential task of prevention, correcting and/or maintaining this type of foot conformation.

Many causes may contribute to the development of

a long toe -under run heel. There may be a genetic basis for this problem, since many offspring appear to be born with or acquire the same foot conformation as one or both parents. In recent years, it appears that an increasing number of foals appear to be born with a low heel and a long toe. Over or under trimming foals or the frequency of trimming may contribute to this type of foot. Are we lowering the heels on foals too quickly? Environmental factors may also predispose a horse to long toe-under run heel. It has been said, "A horse's feet are a product of its environment." The type of climate and footing a young horse is raised in whether dry and hard or wet and soft may play a role. On a hard surface, a youngster will wear its feet

normally as opposed to soft footing where the foot sinks in the ground. Horses that are subjected to continuous or excessive moisture may be affected due to softening of the hoof. Horses with forelimb conformation such as long pasterns or short straight pasterns may be more likely to develop this type of foot. This problem is particularly common in Thoroughbred horses but is present in all breeds. At the racetrack, the tendency has been to maintain a low heel coupled with a long toe with the erroneous thought that this increases stride

length. The use of a toe grab increases the severity of the long toe- low heel (Figure 2). Farriers, in an attempt to prevent shoe pulling in the front feet will use a shoe that is smaller than necessary. This places the bearing surface in front of the vertical axis, creating the same mechanical effect. Over time the foot grows in this configuration. Finally, if the toe is continually allowed to become excessively long, the heels will grow forward. In this instance, I am referring to a long toe, as one would see it if viewed from the bottom of

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Figure 1: Long toe – under run heel. **Figure 2:** Long toe with shoe that is too small. **Figure 3:** Radiograph shows broken back hoof pastern axis.



Long Toe

CONTINUED FROM PAGE 1

the foot, that is the distance from the apex of the frog to the point of breakover. This distance can and does increase in many horses over time as a result of shoeing.

The pathogenesis of this process is logical. Most under-run heels have their genesis in a long toe. Direction of heel growth follows that of toe growth i.e. as the toe becomes long, the heels grows forward and hence lower. This causes the pastern to move forward, creating a broken back-pastern axis (Figure 3). As the heels become low, the horn tubules bend until they reach the point where they are parallel to the ground. At this point they are unable to support weight and will begin to thin, separate, collapse and roll underneath the foot. When this occurs, the heels stop growing while toe growth is unaffected.



Figure 4: Bilateral toe cracks. Note "dish" in dorsal hoof wall.
Figure 5: Quarter crack resulting from hoof conformation.



The compromised heels lose the ability to support weight causing more weight to be placed on the frog, deep digital flexor tendon (DDFT), and digital cushion. If the digital cushion becomes damaged, the frog atrophies and is pushed out of position toward the rear of the foot. The long toe sets up a mechanical lever arm, resulting in laminar tearing. This causes the soles to descend and flatten. A bending of the horn

tubules is also seen in the toe area resulting in a "dish", often accompanied by toe cracks (Figure 4). The severity of the long toe - underrun heel conformation depends on the anatomical changes occurring within the foot.

It is easy to see how the altered mechanics of the foot can lead to lameness. The acute hoof angle, which occurs with a long toe-under run heel increases the tension in the deep digital flexor tendon. Increased tension in the deep digital flexor tendon increases the pressure on the navicular bone and bursa. This is accentuated by the lack of support in the palmar portion of the foot as a result of the heels moving forward. The compromised heels lose both the ability to support weight and to transfer concussion to the supporting structures above the heels, leading to bruising within the heels and the adjacent soft tissue structures. Hoof wall separations, corns, quarter and heel cracks may further compromise the damaged heels (Figure 5). The long toe causes a delayed breakover, which causes further tension to develop in the deep digital flexor tendon. The delayed breakover keeps the foot on the ground longer, often leading to interference problems such as overreaching,

forging, or scalping. The long toe sets up a mechanical lever arm, which exerts an abnormal bending force causing the hoof wall at the toe to deform hence the appearance of a concavity or "dish". Internally, the lamina stretches or tears allowing the sole to flatten. The sole now becomes more susceptible to bruising, especially if heel pain is present as it promotes landing on the toe. The sole wall junction (white line) becomes widened, decreasing protection and allowing easier penetration, which may lead to abscesses.

From the foregoing discussion, you can see the significance of maintaining a normal hoof angle and hoof pastern axis in order to prevent lameness problems associated with the foot. Treatment is easier and more effective if the mechanism of this abnormal hoof conformation is clearly understood. In a future issue of Natural Angle, the methods of treating and preventing this problem will be discussed. ■

*Northern Virginia
Equine Practice
Stephen E. O'Grady, DVM, MRCVS*
7135 Mt. Eccentric Rd.
The Plains, VA 20198
(540) 253-5144
Fax: (540) 253-5167
sogrady@look.net
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A successful commitment to customer service requires some planning. There is no doubt you have to be quick on your feet in dealing with your customers but you can't overlook the advantages of thorough planning.

In the early stages of this planning you need to develop an information base. This can be a basic journal or notebook done manually, or a simple database on a computer system. The computers and software in the market today are relatively easy to work with and can make it much easier to keep your information base current. They also provide options for improving your customer service by allowing you to do mailing labels, form letters and other communication functions.

Customer information

- a. **Customer name(s)**
- b. **Category** - owner, trainer, rider?
- c. **Addresses** - both billing and horse locations
- d. **Phones** - get all of them; home, barn, cellular
- e. **Billing Method** - Cash, open account, credit card?
- f. **Veterinarian** (for specific customer or horse) and number
- g. **Comments** - keep relevant notes about the customer and their horses

The customer info is pretty straightforward but invaluable as you move forward to improve your service level.

The next step would be development of the horse information. You need to determine what information is important to you. It may be that too much info creates unnecessary work but the information you gather and develop

Business Strategy: Information and Customer Service

can be used to enhance your relationships with your customers. In a worst case scenario, suppose a problem develops with one of the horses you have worked on. The information and history you have on file can be used to support your position. It can help you explain to a veterinarian, owner or other interested party exactly what you know about the horse. Information on the horse - accurate information - can only help you.

Horse information

- a. Name of horse(s)
- b. Breed, age, other specific info
- c. Basic owner/trainer/rider info
- d. Veterinarian
- e. History /comments

Once you have compiled your customer and horse information you can then put it to

work. Communications using the database are the next step.

Communications

Billing. This may be the most important "communication" you have with your customer. Without it, you're out of business. Make sure your billing is prompt and accurate. Try to do your

go will be important to you. Make sure your customers understand the terms and meet them.

Maintenance issues. You need to communicate regular maintenance issues to your customers as well as any special instructions for individual cases. You may not see the owner when you shoe the horse but you need to be sure they are aware of what's going on.

Education. As you get more comfortable with the use of your database you can expand your services by sharing educational information with your customers. This can be something as simple as a single page on hoofcare tips or reprints of articles, newsletters or website information. Your

MAKE SURE YOUR BILLING IS PROMPT AND ACCURATE. TRY TO DO YOUR BILLING BY INVOICING, AT LEAST ONCE A WEEK- DON'T WAIT TO DO MONTHLY STATEMENTS.

billing by invoicing, at least once a week- don't wait to do monthly statements. Monthly statements can be helpful - to be sure your customers know you know where they stand. The improved cash flow of billing as you

position will be much stronger if you have tried to help your customers understand what you do to help their horses. You can start by sending information with invoices or doing two or three mailings a year.

Don't expect the gathering and entry of data to happen all at once. Do it as you have time but work to complete the process in a reasonable time-frame. You are building a foundation, take your time and do it as thoroughly as possible.

Look for an article in the future discussing the benefits of scheduling. The database information you assemble will be helpful as you work to get your customers accustomed to scheduling. ■

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SHOE MODIFICATION

An Alternative to Nailing

BY DAVE FARLEY

The technology that is available in today's market has brought forth some products that can offer useful alternatives to nailing. There are a few reasons you might choose to glue on a shoe instead of nailing.

- Poor quality hoof wall
- Missing hoof wall
- Thin soles
- Low, under run heels
- Hoof overly sensitive to impact of nailing

Be sure to use caution whenever you decide to glue on a shoe. Never glue over any abscess or area that is damp or has drainage. Never glue over a sensitive

area in the wall (open crack). Never glue to the coronary band or the bulbs of the heel; apply vetrap to protect coronary band and bulbs. Always wear rubber or surgical gloves. Work in a well-ventilated area.

You need to be organized to save time and get the job done properly. Have all your materials and tools laid out and work in a systematic fashion. The colder the temperature, the more important it is to use a fast set glue and heat gun to accelerate set time.

Start by trimming the hoof. Remove all flares, dishes, loose wall, sole and

dirt and debris. Make sure your customers haven't applied any dressings or oils to the hoof before you get there. If there are any oils present the chances of successful gluing are diminished.

The heel quarters and the back of the heel area are the most critical areas for achieving a good bond. Be sure to file all dirt and debris from these areas. The area doesn't have to be smooth, just clean.

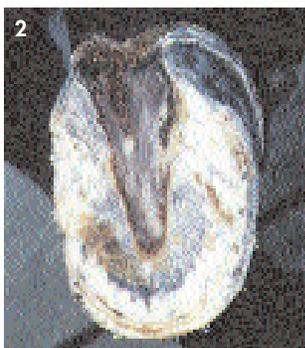
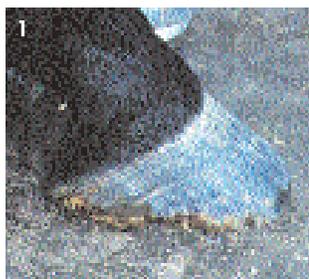
Pare the sole area and bar area to remove any debris. Make sure you have no pockets of dirt- covering these can create significant problems. Don't over trim the frog- you don't want material to bond here and some excess frog can help protect against bonding.

Once you have completed the hoof preparation you can prepare the shoe of your choice. Clipped shoes are always going to be more secure than unclipped. Be sure to fit the shoes full in the heel area, particularly on

the under run heel. When you have fit your shoe, use an old sock or other type of cover to keep the hoof clean while you are preparing your shoe and material. You can use a spray-on degreaser as a final cleaning step before covering the hoof. Acetone is not recommended as it often penetrates the surface and doesn't always dry completely. You should have your shoe completely finished at this point. Using an angle grinder or belt sander you should clean the foot surface of the shoe to be sure there are no oils present (from your hands or the horse.) Set it next to your mixing area.

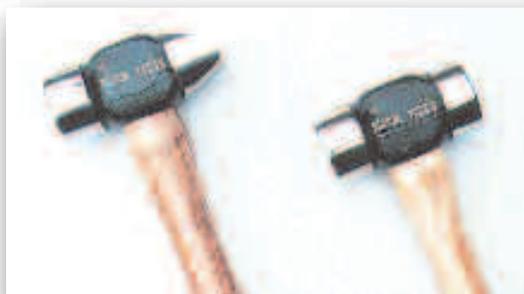
Your organization is now critical. Have all your materials beside the horse and ready to go. If you choose to use Spectra or fiberglass to reinforce the glue, have it cut and ready before you begin mixing the glue. Make sure you have enough glue before you start mixing.

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1 - Foot before prep, notice shelly weak appearance of wall. 2 - Hoof prep is most critical step. Heel area and sole should be pared to solid, clean surface. 3 - Have your materials ready to go. Wear surgical or plastic gloves when working with repair materials.

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Alternative

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You can now start mixing the glue. Be sure to wear gloves! Whether you use mixing cups or work on a piece of plastic be sure your material is thoroughly mixed. If you are using fibers, mix them in as you mix the glue. In warm weather you have to move quickly. When the material is mixed, remove the protection

from the foot and begin applying the glue. Put a thin coat over the entire ground surface of the wall, including some of the sole area (1/2 - 3/4"). Also apply a thin coat to the outer wall. Now put a heavier application on the heel quarters, extending up the wall- but not to the coronary band. You can now set the shoe.

Place the shoe on the hoof and work the material to it. Be sure to get a good application to the inner web of the shoe where it contacts the sole. You should

have a piece of mylar or rigid clear plastic to wrap around the entire hoof and sole area. Work the material with your fingers to be sure you have a good, continuous line of material. In the pictures you will see the important areas of coverage.

Wrap the hoof with vetrap or elastikon and continue to press the material and work it as it is setting. When you feel the material is firm enough, set the foot on the ground. Give it ample time to cure before uncovering and beginning your

finish work. The material will gum up your rasp so keep a wire brush handy.

Try to schedule a reset within 4-5 weeks if possible. You can remove all the glue from the wall and use a pair of nippers to break the bond in the heel area. Be careful not to destroy any new hoof growth.

In a future article we will examine more closely the process of building heels by gluing shoes. ■



4 - Once you've glued the shoe and it has set firm enough to put the foot down, a heat gun will help with the curing process. **5** - Rasp to finish. You'll notice that very little material is needed in toe area. The material in the heel area is the most critical. **6** - Buildup of material in heel area provides strength to job. **7** - Another glue job showing the material buildup in the heel area. **8** - Side view shows material concentration in heel area. **9** - Ground surface shows material under shoe bonding to sole - be sure your sole area is cleaned well. Material coming through nail holes and filling crease helps secure shoe.