

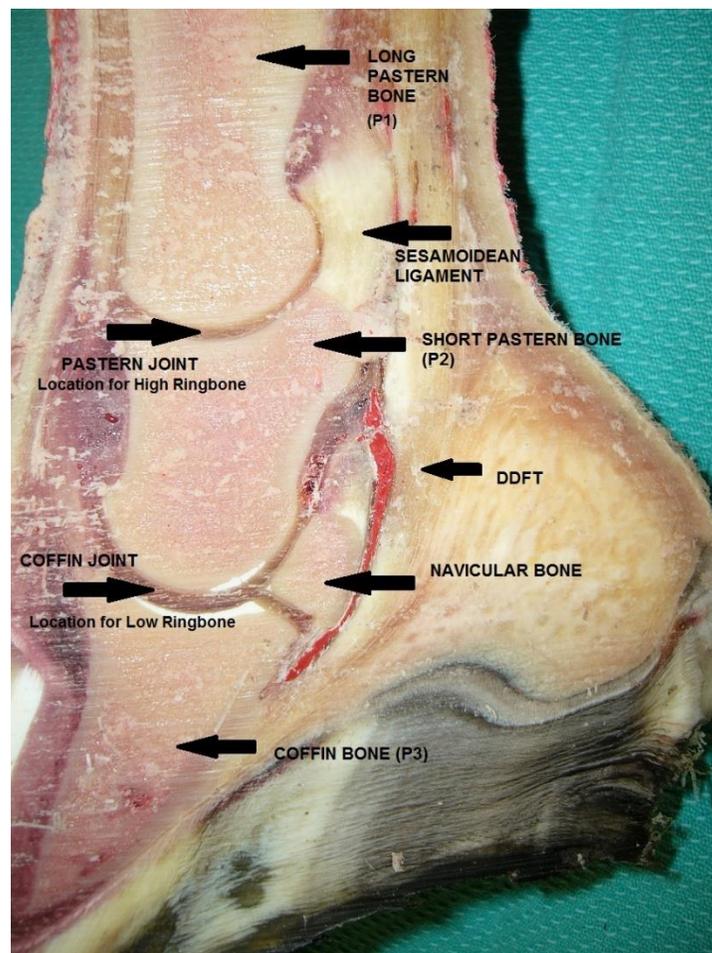
All you need to know about ringbone

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Ringbone is generic term for arthritis of the two bottom joints in the leg. There are two 'types' of ringbone; High ringbone – pastern joint arthritis, and Low ringbone – coffin joint arthritis. Both types can cause significant lameness in your horse but understanding the cause, symptoms and treatment options will help you navigate the somewhat confusing terminology and differences in the conditions.

To begin a discussion about the pastern and coffin joints, we need to understand the anatomy of the limb to ensure everyone is talking about the same spot.

The coffin joint (aka distal interphalangeal joint) is located between the coffin bone and the short pastern bone. This is the first joint encountered from the ground up. The coffin joint is a high motion joint that allows the hoof to articulate with the ground through the full range of gait. The coffin joint is intimately associated with the navicular bursa and navicular bone at the back of the joint. The navicular bursa is paper thin where it comes to separate the coffin joint from bursa. There are two large collateral ligaments between the short pastern bone and the coffin bone. These ligaments are located at about 45 degrees from midline on both the medial and lateral side of the joint (Fig 1)



The pastern joint (aka proximal interphalangeal joint) is located between the short pastern bone below and the long pastern bone above. It is the only joint between the fetlock and the coffin joint. The pastern joint is a low motion joint. It has limited articulation but does provide a small degree of additional extension of the foot during the landing phase of the gait. At the back of the pastern joint, the superficial digital flexor tendon attaches to the top of the short pastern bone and this is also the spot where the distal sesamoidean ligaments attach to provide support to the back of the pastern and the soft tissue structures supporting the back of the lower leg. This joint also has collateral ligaments located at about 90 degrees from midline on both medial and lateral sides of the joint (Fig 1)

Low Ringbone (Coffin Joint Arthritis)

Arthritis of the coffin joint has many causes with some of the more common being collateral ligament injuries, navicular bursitis, navicular disease (damage to the navicular bone or soft tissues of the back of the foot resulting in inflammation), bone chips or OCD fragments within the coffin joint to name a few. Arthritis is the result of instability and/or inflammation of the joint. Arthritis is a progressive condition of the joint and is the body's means of trying to stop pain coming from the joint by trying to fuse the joint into a non-moving position. When the joints movement stops, the pain is eliminated.

Low ringbone can occur over a long period of time (years) or can be rapidly progressive (months). Most cases take a long time to start causing significant lameness but can sometimes be pick up on xrays before the pain begins or in association with another clinical diagnosis such as navicular disease. Low ring bone is a cause of significant lameness as it progresses. A horse with coffin joint arthritis may have some effusion or increased fluid within the joint which your vet will palpate. The horse may also have a firm swelling on the front of the short pastern bone just above the coronary band. The vet may notice a decreased range of motion of the coffin joint or pain when the joint is flexed. When the vet blocks the foot (uses a local anesthetic to desensitize the nerves to a particular area of the limb), most horses will only improve about 50% from the initial nerve block (called the palmar digital nerve block) and will improve by 80-90% when the vet performs the next nerve block higher up the limb (called the abaxial nerve block). The reason for this is that the nerves that supply the front and back of the coffin joint branch at different levels and this can be used by the vet to begin to narrow the diagnosis to the coffin joint. Another option for the vet to confirm the source of the lameness to the coffin joint is to perform a coffin joint block. This is where the coffin joint is directly injected with anesthetic. This is not commonly done as once the standard two nerve blocks have been performed, the vet would have to wait several hours for those blocks to wear off before they could use the joint block to confirm the source. This may be necessary in some cases, but your vet will know best when to use this technique.

With the nerve blocks performed and the lameness confirmed to be in the lower part of the limb below the fetlock, radiographs (xrays) are needed to help determine if there are any arthritic changes that can be seen. Xrays of the foot are taken and the standard set of foot xrays should include 4 different views to ensure that no bony changes will be missed or misdiagnosed. Since coffin joint arthritis is often associated with navicular disease or caudal heel pain changes, often the vet will be commenting on those changes as well. As mentioned before, the body's method of controlling inflammation of any joint is to try to stop the joint from moving. The body does this by producing bone on both sides of the joint that it is trying to fuse. This new bone is what the vet is looking for on the xrays. (Fig2)



If no bony changes can be seen, then there are a couple possibilities. First, xrays lag behind pathology by about 2-4 weeks. So if the arthritis has only just begun recently, the xrays may not show any changes yet. Second, the damage to the joint is caused by a soft tissue injury such as a collateral ligament tear. If the vet suspects a collateral ligament tear then an ultrasound of the collateral ligaments may be necessary

Other times the arthritis may be due to a developmental orthopaedic disease such as OCD or a fracture within the joint (Fig3).



The treatment options for low ringbone revolve around managing the level of pain and inflammation caused by the arthritis or soft tissue injury. Initial management is with anti-inflammatories such as bute or Firocoxib (Previcox or Equioxx) in addition to changes in farrier work to ensure an early breakover and appropriate heel. Depending on severity, those steps may be all that is needed and continued monitoring will be performed. In many horses, unfortunately, this level of management will not result in soundness and for those horses, injection of corticosteroid into the joint may be necessary to produce soundness. As this is a high motion joint, concurrent injection of the joint with hyaluronic acid is recommended as well. As a side note, ensure that the hyaluronic acid being injected is of sufficient quality to be injected into a joint. Some practitioners continue to use substances such as MAP5 which are not suitable for joints. The use of corticosteroids should always be considered carefully with full knowledge of the risks involved. Potential risks include joint infection and laminitis. These complications are very rare (1:10000-1:100000) but be aware of the possibility. In addition, not all corticosteroids are ideal for high motion joints. Triamcinalone has a better cartilage safety profile compared to methylprednisolone, however, in some horses methylprednisolone is the only medication strong enough to produce soundness.

There are some newer treatments which have shown promise in managing low ringbone such as the biologic therapies – IRAP, PRP and stem cells. These treatments are as yet unproven in healing the damage inside the joint but have shown positive results in some horses. IRAP is a biologic used in other joints to decrease inflammation and improve soundness and in my experience seems to do so for the coffin joint as well. With any of the treatments, a timeline of soundness always exists and eventually the drug or biological therapy will wear off and need to be repeated.

The definitive cure for arthritis of the coffin joint is fusion of the joint. Natural fusion of the coffin joint is rare as the coffin joint is high motion and the pain associated with the arthritis is usually too severe and results in an inhumane degree of lameness with horses being euthanized for quality of life considerations. Surgical fusion of the coffin joint is possible but complications with the traditional surgical techniques have been too high, however, recent advances in the technique have shown some promise and within the next year there may be a reliable, safe method to fuse the coffin joint consistently. As the coffin joint is high motion, fusion of the joint does result in some degree of restricted range of motion, however, horses with fused coffin joints have been returned to athletic completion at the advanced jumper level and in the western ring as well. This advancement may lead to a possibility for horses with low ringbone to have a positive prognosis rather than the current guarded to poor prognosis for future soundness.

High Ringbone (Pastern joint arthritis)

Unlike the coffin joint, the pastern joint has a limited range of motion. Arthritis in this joint is usually the result of joint instability due to collateral ligament injury, OCD, fracture fragments, cartilage degeneration or uneven load bearing due to conformational deficits of the limb. Arthritis in this joint is similar to others where the body is forming bone around the joint margins with the goal of eventually fusing the joint completely.

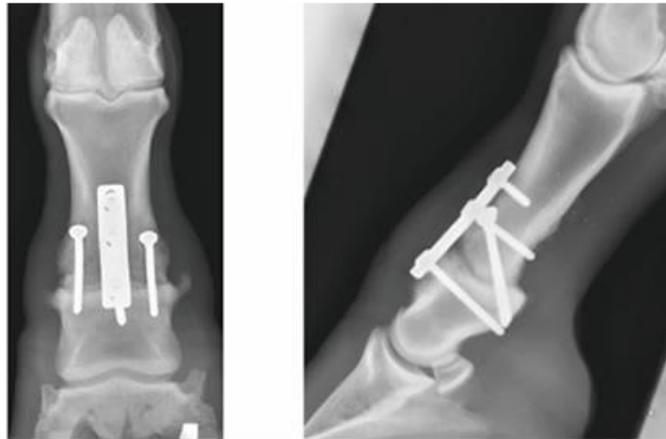
High ringbone can also either be a slow process over years of work or may be rapidly progressive in as little as weeks depending on the inciting cause. One of the cardinal signs of high ringbone is the buildup on bone around the pastern joint that can be seen and palpated. As the pastern joint doesn't have a great degree of motion, it can be difficult to appreciate any changes in range of motion. However, flexion of the lower limb will make the lameness worse. Effusion of the pastern joint is rarely appreciated by the vet. The blocking pattern for high ringbone is similar to low ringbone except that the first nerve block (palmar digital nerve block) usually does not produce any improvement in the lameness or only 25% improvement, whereas, the abaxial nerve block will produce 80%+ improvement in the degree of lameness seen. More commonly, the pastern joint needs to be blocked to confirm the location of the lameness. This is due to migration of the anesthetic from the palmar digital nerve up the limb resulting in confusion of the results from the initial nerve blocks.

Xrays of the pastern joint will generally show obvious new bone being formed around the margins of the joint on both the short and long pastern bone. In addition, there may be some calcification or mineralization of the attachments of the distal sesamoidean ligaments as they run down the back of the long pastern bone (Fig 4). The amount of new bone can be impressive as the body desperately tries to fuse the joint completely. For the pastern joint xrays, 4 views of the joint is standard to ensure that all components of the pathology are seen and appreciated before attempting treatment. Ultrasound is rarely used as damage to the collateral ligaments results in fairly rapid calcification. Occasionally, natural fusion of the pastern joint will be found on horses with bony buildup around the joint.



The treatment options for high ringbone involve many of the same options as for low ringbone including anti-inflammatories and shoeing modifications. Corticosteroid injection of the pastern joint can be performed but the results are often not as favorable as with the coffin joint. Steroid injections tend to only improve the level of lameness in about 50% of cases and for a variable period of time from 2-8 weeks usually. Given this short term improvement, corticosteroid joint injections are often foregone in preference of surgical joint fusion.

The pastern joint can be very successfully treated with surgical fusion. Essentially the goal of surgery is to complete the body's goal of bridging the joint and stopping the joint from moving, hence relieving the pain. Surgical fusion of the pastern joint has gone through many revision of technique over the past 20 years with the current technique involving a 3 hole stainless steel orthopaedic plate placed down the front of the joint to bridge the front of the short and long pastern bones and then two large screws passes from the front of the long pastern into the back of the short pastern across the joint to stabilize the back of the joint (Fig 5). This construct rendering the joint immobile and allows for the body to complete the fusion process over about 4 months following surgery. This surgery is a major orthopaedic procedure and requires a skilled, trained surgeon to perform it. The horse goes into a cast for approximately two weeks following the surgery and then there is about 3-4 month of rest to follow with a structured rehabilitation program. The outcomes are very favorable though. In horses requiring a front leg pastern arthrodesis, the published prognosis for returning to full athletic use is between 46-80% (usually closer to 75-80% becoming sound and returning to athletic use in my practice). For hindlimb pastern arthrodesis, the published prognosis for return to athletic use is between 80-95% (usually around 85% in my practice). These are excellent outcomes for getting a horse from a painful unsoundness to return to athletic performance.



Conclusions

Both high and low ringbone are the result of arthritis of their associated joints. Arthritis is a progressive disease with ultimate outcomes being chronic lameness and in some cases severe, degenerative pain resulting in the horse needing to be put down. Successful management of the condition is far more viable for the high ringbone (pastern arthritis) horse compared to the low ringbone (coffin joint arthritis) horse due to the excellent outcomes seen with surgical fusion of the pastern joint compared with the coffin joint (to date). Unfortunately, low ringbone (Coffin joint arthritis) remains very difficult to treat and carries a poor prognosis for soundness. New treatment options and improved surgical techniques are advancing and there is promise for improvement in the management of both type of ringbone, especially low ringbone, in the future.