EQUINE LAMENESS
Figure 1.2. Bones of the left equine thoracic limb (lateral view).
Figure 1.3. Topography of the solar surface of the hoof. The right half has been trimmed to emphasize the region of the white line.
LAMENESS

• General Signs: Head bobbing, dropping hip, pointing, strong digital pulse
LAMENESS

Predisposing factors:

- Immaturity for hard work (racing 2-year-olds)
- Faulty conformation
- Poor condition or conditioning
- Nutritional deficiencies or imbalances
- Fatigue - tendon and ligament sprains
- Improper shoeing
- Illness
- Local leg infections
Signs of acute lameness

- Increased heat
- Changes in shape or size
- Discolored spots on sole
- Abnormal wear patterns
  - Soft swelling
  - Thickening of tendons
  - Hard lumps
Causes of lameness

- Poor shoeing
- Poorly balanced diet
- Turning out a fresh horse
- Inadequate dental care & bitting problems
- Improper training, riding techniques

- Cold water on a hot back
- Inadequate warm-up & cool-down
- Poorly fitting saddle &/or dirty padding
- Leaving the cinch too tight for too long
- Inadequate grooming
LAMENESS

PREVENTATIVE MEASURES:

• Icing & cold hosing
• Massage
• Stable wraps
• Topical preparations
  • Braces
  • Poultices
  • Sweats
  • Liniments
Bucked Shin

- Bucked shins is a painful, acute periostitis on the cranial surface of the large metacarpal or metatarsal bone.
- Seen most often in the forelimbs of young Thoroughbreds (2- to 3-yr-olds) in training and racing.
- This injury is generally brought about by strains placed on the long bone during high-speed exercise in young horses in which the bones are not fully conditioned. Microfractures (ie, stress fractures) are believed to be involved.
- Subperiosteal hematoma formation and thickening of the superficial face of the bone may be all that is clinically apparent. It may progress to a cortical saucer fracture or incomplete longitudinal fracture.
- There is a warm, painful swelling on the cranial surface of the affected bone.
- The horse is usually lame initially, the stride is short, and the severity of the lameness increases with exercise.
Definitions

- Periostitis - medical condition caused by inflammation of the periosteum (layer of connective tissue that surrounds bone)
- Condition is generally chronic, and is marked by tenderness and swelling of the bone and pain
- Usually, due to infection
- Characterized by diffuse formation of pus, severe pain, and usually results in necrosis (death of cells and tissue)
- Can be caused by excessive physical activity as well, as in the case of shin splints (tibial periostitis)
- “itis” = inflammation of...
Treatment of Bucked Shin

• Rest from training is important until the soreness and inflammation resolve.

• The acute inflammation may be relieved by anti-inflammatory analgesics (pain reducers) and application of cold packs.

• Screw fixation of fissure fractures may be indicated in older horses with dorsal cortical fractures that fail to respond to conservative treatment.
a normal tendon  classic bowed tendon  low bow  mid bow  high bow
Tendons and ligaments of the lower leg.

- Superior check ligament
- Inferior check ligament
- Suspensory ligament
- Annular ligament
- Common digital extensor tendon
- Suspensory ligament
- Superficial digital flexor tendon
- Deep digital flexor tendon
- Tendon sheath area
Tendinitis
(Bowed Tendon)

• Inflammation of a tendon can be acute or chronic, with varying degrees of tendon fibril disruption.
• Tendinitis is most common in horses used at fast work, particularly racehorses.
• The problem is seen in the flexor tendons and is more common in the forelimb than in the hindlimb.
• In racehorses, the superficial flexor is involved most frequently.
• The primary lesion is a rupture of tendon fibers with associated hemorrhage and edema.
Tendinitis
(Bowed Tendon)

Etiology:

• Tendinitis usually appears after fast exercise
  – Associated with overextension and poor conditioning, fatigue, and poor racetrack conditions
  – Also, persistent training when inflammatory problems in the tendon already exist.
  – Improper shoeing may also predispose to tendinitis.
  – Poor conformation and poor training also have been implicated.
Tendinitis
(Bowed Tendon)

• During the acute stage, the horse is severely lame and the involved structures are hot, painful, and swollen.
• In chronic cases, there is fibrosis with thickening and adhesions in the peritendinous area.
• The horse with chronic tendinitis may go sound while walking or trotting, but lameness may recur under hard work.
• Ultrasonography delineates many defects and injuries that are ill-defined or undetectable by palpation.
• The prognosis for a racehorse to return to racing after a bowed tendon is guarded, regardless of treatment.
Tendinitis
(Bowed Tendon)

Treatment:

- Tendinitis is best treated in the early, acute stage.
- Horse should be stall-rested, and the swelling and inflammation treated aggressively with cold packs and systemic anti-inflammatory agents.
- Some degree of support or immobilization should be used, depending on the amount of damage to the tendon.
- Recently, the use of bone marrow injection of the core lesion (to introduce stem cells and growth factors) has been done with encouraging results.
- The horse should be rehabilitated using a regimen of increasing exercise.
- Other treatments for chronic tendinitis have included superficial point firing (of questionable benefit), tendon splitting, and carbon fiber implantation.
Hygroma of the Elbow "Shoe Boil"

Recumbent horse with hoof rubbing elbow

Hygroma lesion of the elbow

Surgical incision after removal of hygroma
Capped elbow (shoe boil)

- Capped elbow and hock are inflammatory swellings of the subcutaneous bursae located over the olecranon process.
- Trauma from lying on poorly bedded hard floors, kicks, falls, riding the tailgate of trailers, iron shoes projecting beyond the heels, and prolonged recumbency are frequent causes.
- Circumscribed swelling develops over and around the affected bursa.
- Lameness is rare.
- Bursa may be fluctuating and soft at first but, in a short time, a firm fibrous capsule forms.
- Initial bursal swellings may be hardly noticeable or quite sizable.
- Chronic cases may progress to abscessation.
Capped Elbow (Shoe Boil)
Capped Hock

- Acute early cases may respond well to applications of cold water...
- Followed in a few days by aseptic aspiration and injection of a corticosteroid.
- Bursa may also be reduced in size by application of a counterirritant or by ultrasonic or radiation therapy.
- Older encapsulated bursae are more refractory.
- Surgical treatment (usually curettage and drainage) is recommended for advanced chronic cases or for those that become infected.
- A shoe-boil roll should be used to prevent recurrence of a capped elbow if the condition has been caused by the heel or the shoe.
- With capped hock, behavioral modification so the horse does not kick the stall offers the only hope of permanently resolving the problem.
Side bone

- Sidebone is ossification of the cartilages of the third phalanx (coffin bone)
- Most common in forefeet of heavy horses working on hard surfaces
- Frequent in hunters and jumpers but rare in racing Thoroughbreds
- Repeated concussion to the quarters of the feet is the essential cause
- Predisposition may be inherited, but this has not been confirmed
- Improper shoeing that inhibits normal physiologic movement of the quarters is also predisposing
- Some cases arise from direct trauma
sidebone is the progressive ossification of the normally flexible lateral cartilage that lies either side of the pedal bone
Side bone

• Sidebone may be suspected after palpation and observation, but radiographic examination is essential for confirmation
• Remember that ossification of the cartilages often develops without signs of lameness
• When lameness is present
  – shoe to promote expansion of the quarters
  – protect the foot from concussion
• Applying a counterirritant (tincture of iodine) to the coronary region will promote hoof growth and is thought to promote expansion of the wall.
Ring bone

- Ringbone - periostitis or osteoarthritis of the phalanges that leads to exostoses
- Causes include:
  - faulty conformation, improper shoeing, or repeated concussion from working on hard ground
  - trauma and infection, especially wire-cut wounds, are also incriminated
  - strain of ligaments and tendinous insertions in the pastern region
  - Part of osteochondrosis syndrome in young, rapidly growing horses.

Bilateral ringbone

- Characteristic bell-shaped appearance to the pastern region
- Lameness due to periostitis is seen initially
- Once bone proliferation has occurred, lameness may not be present
- Lameness usually occurs and persists if the joint surfaces are involved,
- May progress to ankylosis.
Ringbone
Definitions

• Osteochondrosis:
  – temporary orthopedic disorder of rapidly growing horses in which the epiphysis (growing end) of a dies and then is gradually replaced over a period of years
  – immediate cause of bone death is loss of blood supply - why this occurs is unclear

• Osteoarthritis:
  – disease affecting the joints and affects almost every animal as they get older
  – cartilage cushion between bones becomes thin and uneven and over time wears out completely
  – at the same time, the joint capsule becomes thicker and more synovial (lubricating) fluid is manufactured which makes the joint swell
  – bony spurs grow causing inflammation in the surrounding tissues
  – can involve all joints of the body

• Enthesopathy:
  – disease process occurring at the site of insertion of muscle tendons and ligaments into bones or joint capsules.

• Myoclonic:
  – A sudden twitching of muscles or parts of muscles, without any rhythm or pattern
Ring bone

• Clinical diagnosis is based on visualization and palpation of soft-tissue thickness and new bone proliferation in the pastern region
• Range of joint movement is restricted
• There is pain on forced flexion of the involved articular surfaces
• Regional nerve blocks identify the pastern region as the site of pain
• Radiography confirms the diagnosis
• Complete rest - most important requirement for treatment
• Cold and astringent applications as well as radiation therapy in the early stages may be beneficial
• Anti-inflammatory medication may relieve the signs of lameness
• Surgical arthrodesis of the pastern joint is curative
• Can restore the performance future of young horses with osteochondrosis
**Ringbone**

Radiograph showing extensive new bone growth in a horse with both high and low ringbone.

Infrared thermograph depicting increased thermal gradient on the dorsal surface of the pastern joint.

- **High ringbone**
- **Low ringbone**
- **Articular ringbone**
- **Periarticular ringbone**

Incision site for neurectomy

Neurectomy of the dorsal branch of the palmar digital nerves

Surgical arthrodesis of the pastern joint using screw fixation
High Ringbone
Osselets

- Osselets refer to an inflammation, usually bilateral, of the periosteum on the dorsal distal epiphyseal surface of the third metacarpal bone and the associated capsule of the fetlock joint
- The proximal end of the first phalanx may also be involved
- Traumatic metacarpophalangeal arthritis
- Osselets constitute a form of periostitis and serous arthritis that may progress to degenerative joint disease
- Cause is the strain and repeated trauma of hard training in young horses and is recognized as an occupational hazard of the young Thoroughbred.
Osselets

• **Signs:**
  • The gait is short and choppy
  • Palpation and flexion of the fetlock joint produce pain
  • Careful examination reveals a soft, warm, sensitive swelling over the front and sometimes the side of the joint
  • In the initial stages, no evidence of new bone formation – early condition termed “green osselets”
  • Later, enthesopathy may be seen in the area of attachment of the fetlock joint capsule to the large metacarpal bone and first phalanx
  • New bone or spur formation may break off and appear as “joint mice.”
Osselets

• Treatment – mild cases:
  – Rest, PT, topical capsaicin or DMSO+cortisone

• Treatment – acute cases:
  – Four to six weeks rest, cold hydrotherapy for 48 hours, followed by warm hydrotherapy + topical capsaicin or DMSO+cortisone

• Treatment - unresolved acute cases:
  – Intra-articular or systemic admin of sodium hyaluronate, followed by 3-4 days rest

• Treatment - chronic cases:
  – Intra-articular or systemic sodium hyaluronate and systemic polysulfated glycosaminoglycans
Splints
Interosseous Desmitis

• Splints involve the interosseous ligament between the large (third) and small (second) metacarpal bones
• Can also involve the metatarsal bones (less frequently)
• The condition is a periostitis with production of new bone (exostoses) along the involved splint bone
• Caused by:
  – Trauma from concussion or injury
  – strain from excess training (especially in the immature horse)
  – faulty conformation
  – imbalanced or over-nutrition
  – improper shoeing
Splints

Splint

Sesamoiditis
Predisposing conformation faults include bench knees or base narrow, toe-out faults.

"True splint": a tear in the interosseous ligament.

"Blind splint": an inflammation only of the interosseous ligament

Injection of the interosseous ligament with corticosteroids.

Warm, moist heat packs applied prior to exercise and training.

Radiograph showing periostitis of the splint bone.

Infrared thermograph depicting an increased thermal gradient in a focal area on the left as compared to a normal infrared thermograph on the right.

Splint boots worn during training and competition.

Topical application of capsaicin ointment.

Artwork by S. Hakola / J. Dirix
Splints

- Splints most commonly involve the medial rudimentary metacarpal bones
- Lameness is seen only when splints are forming and is seen most frequently in young horses
- Lameness is more pronounced after the horse has been worked
- In the early stages, there is no visible enlargement
- In the later stages, a calcified growth appears
- After ossification, lameness disappears, except in rare cases in which the growth encroaches on a ligament or carpometacarpal articulation
- Radiography is necessary to differentiate splints from fractured splint bones.
Splints

• Complete rest and anti-inflammatory therapy is indicated
• Intralesional corticosteroids may reduce inflammation and prevent excessive bone growth
• Corticosteroid use should be accompanied by counterpressure bandaging
• In Thoroughbreds, it has been traditional to point-fire a splint, the aim being to accelerate the ossification of the interosseous ligament
• If the exostoses impinge against a ligament, surgical removal may be necessary
Sesamoiditis
Popped Sesamoid

- The inflammation or dislocation of the proximal sesamoid bone(s)
- May involve an actual fracture of a sesamoid bone
- Sesamoiditis can be the result of direct injury, uneven weight bearing, or fatigue.
- Or, sesamoiditis can be totally due to soft tissue inflammation
- All components of fetlock are subject to high strain during extreme extension (vigorous exercise)
- Tearing of fibrous attachments to the sesamoid bones can occur
- Lameness occurs
- Sesamoid bones change – new bone laid down, contours change
Sesamoiditis
Popped Sesamoid

• Changes in sesamoid bone morphology are permanent
• Focus on treating the causative inflammatory process
• Confined rest with NSAIDS (phenylbutazone) and cryotherapy
• Complete healing requires prolonged rest (as in any ligamentous injury)
• Once sesamoid morphological changes are seen on the radiographs, return to full athletic ability is unlikely
Quittor

- Quittor - chronic, purulent inflammation of the cartilage of the third phalanx
  - characterized by necrosis of the cartilage and
  - one or more sinus tracts extending from the diseased cartilage through the skin in the coronary region
  - follows injury to the coronet or pastern over the region of the cartilage
  - may follow a penetrating wound through the sole
  - first sign is an inflammatory swelling over the region, followed by abscessation and sinus formation
  - During the acute stage, lameness occurs
FOREFOOT DISORDERS

Quittor, Sidebone

Necrotic lateral cartilage of the distal phalanx created by chronic inflammation and infections seen in quittor.

Radiograph showing drainage tract with use of radiopaque probe.

Ossification of the lateral cartilage of the coffin bone as seen in sidebone.

Infrared thermograph depicting focal areas of increased thermal gradient of both ossified lateral cartilage.

Surgical debridement of quittor involves removal of all necrotic tissue. The wound is packed daily with iodine-soaked gauze and aseptically wrapped.

Ossification in the cartilage is seen on this radiograph.

Corrective shoeing with a shock-absorbing shoe and pad reduces concussive forces.
Quittor

• Surgery to remove the diseased tissue and cartilage is usually successful
• Local or parenteral (injection or infusion) therapy (or both) without surgery is likely to fail
• Can lead to chronic lameness and extension to deep structures
• If distal interphalangeal joint has been invaded, the prognosis is unfavorable
• It is seldom encountered today but used to be common in working draft horses
Popped Knee
Carpitis

- Inflammation of synovial membranes of bones of carpal joint, producing swelling, pain, and lameness
- Common acute or chronic inflammation of joint capsule of carpus
- Accompanied by pain (dorsal surface of carpal bones) and during flexion and swelling
- There may be exostoses in chronic cases
- Overextension of the carpus (TBs & Jumpers) bruises bones and sets up a periostitis
- Rest, PT, NSAIDs and intra-articular or systemic sodium hyaluronate and systemic polysulfated glycosaminoglycans
Carpitis

Clinical appearance of carpitis.

Epiphysitis and Carpitis

Overextension of the carpus.

Intraarticular injection of sodium hyaluronate coupled with systemic polysulfated glycoaminoglycans.
Wind Puffs
Tenosynovitis

- Tenosynovitis - an inflammation of the synovial membrane and usually the fibrous layer of the tendon sheath,
  - characterized by distention of the tendon sheath due to synovial effusion.
  - various types of tenosynovitis include idiopathic, acute, chronic, and septic (infectious).
  - idiopathic synovitis refers to synovial distention of tendon sheaths in young animals, in which the cause is uncertain
  - acute and chronic tenosynovitis are due to trauma
  - septic tenosynovitis may be associated with penetrating wounds, local extension of infection, or a hematogenous infection
Wind Puffs

• Horses are markedly lame in septic tenosynovitis
• Chronic tenosynovitis is common in horses in the tarsal sheath of the hock (thoroughpin) and in the digital sheath (tendinous windpuffs)
  – these 2 entities must be differentiated from bog spavin and synovial effusion of the fetlock
• Treatment:
  – In idiopathic cases, no treatment is initially recommended
  – Acute cases with clinical signs - treated symptomatically with cold packs, NSAID, and rest
  – Application of counterirritants and bandaging has been used in more chronic cases
  – Radiation therapy is helpful
  – Septic tenosynovitis requires systemic antibiotics and drainage
  – If adhesions develop between the tendon sheath and the tendon, persistent effusion and lameness is the rule
Wind Puffs
Sand Cracks
Toe Crack, Quarter Crack

• Cracks in the wall of the hoof - beginning at the coronet and running parallel to the horn tubules
• Most common in racehorses
• Excess drying of the hoof, trauma, and conformational factors are most likely causes
• Extensive injury to the coronet may give rise to a crack in the wall
• This “false quarter” is characterized by buildup and overlapping of the hoof wall at the site of injury
Sand Cracks
Toe Crack, Quarter Crack

• A crack in the horn emanating from the coronet is most obvious sign
• Horse is not usually lame
• If infection is established, there may be a bloody or purulent discharge and signs of inflammation and lameness
• Therapy involves surgery and corrective shoeing to change the distribution of weight on the hoof
• Growth of new horn may be encouraged by application of a counterirritant (eg, tincture of iodine) to the coronet over the crack
• If the crack has become infected, apply an antiseptic pack wall.
Sand Cracks
Toe Crack, Quarter Crack

- Patching techniques, using acrylics or fiberglass, are useful
- Complete stripping of the wall, caudal to crack, being careful not to damage the coronet, - treatment in early and severe quarter cracks
- The hoof is then bandaged until new horn formation is evident
- The horse is then shod with a three-quarter or three-quarter-bar shoe to relieve any pressure over the stripped portion of the wall
Stifled

• True dislocation of the patella is uncommon in horses. When it does occur, it is usually a serious injury
• The most frequent problem involving the patella is upward fixation
  – locking of the medial patellar ligament over the proximal part of the medial femoral trochlear ridge
  – patellar luxation is seen in immature animals with poorly developed thigh muscles
  – may be uni- or bilateral
  – classical signs are of an intermittent locking of the limb in extension followed by a sudden jerk or hyperflexion as the patellar ligament becomes freed from the medial trochlear ridge
STIFLE DISORDERS

Upward Fixation of the Patella, Patellar Fractures, Patellar Chondromalacia

Clinical appearance of upward fixation of patella: extended stifle and hock.

Post-leg conformation of the hindlimb predisposes the horse to upward fixation of the patella.

Skyline view radiograph of a patellar fracture depicting lag screw fixation.

Infrared thermograph shows a focal area of increased thermal gradient over the patella in patellar chondromalacia.

Medial patellar ligament

Medial patellar desmotomy

Patellar fibrocartilage

Medial articular surface

Patellar chondromalacia

Degeneration of the patellar articular cartilage as seen in chondromalacia.
• In many cases, a general improvement in fitness and muscle tone of the hindquarters effects a cure.

• In the more severe and persistent cases, desmotomy of the medial patellar ligament is indicated.

• However, desmotomy, which has been commonly used in the past, is currently in disfavor.
  – Fragmentation of the distal extremity of the patella is believed to follow the surgery, particularly if postoperative exercise is initiated early.
  – When surgery is done, rest should be sufficient (eg, 4-6 wk) to permit complete healing before training is resumed.
Bog Spavin

- Bog spavin is a chronic synovitis of the tibiotarsal joint characterized by distention of the joint capsule
- Faulty conformation leads to weakness of the hock joint and increased production of synovia
- In such cases, both limbs are affected
- The unilateral case is more likely to be a sequela of a sprain or some underlying problem within the joint (eg, osteochondrosis)
Bog Spavin
Bog Spavin

• The excess fluid within the joint capsule can be aspirated
• Intra-articular corticosteroids provide variable and transient relief
• Repeat procedure in three weeks, if necessary
• Arthroscopy should be done when osteochondral involvement is suspected
• Bog spavin tends to recur, especially if poor conformation is a factor.
Localized inflammation of the cunean bursa

Infrared thermography will show a focal area of increased thermal gradient surrounding the cunean bursitis

Clinical appearance of swelling on the dorsomedial aspect of the hock as seen in bog spavin

Cunean Bursitis

Bog Spavin

Topical application of capsaicin to the entire hock area and the use of warm moist heat will reduce the inflammation and diminish pain

Post leg conformation fault will predispose the horse to bog spavin

Artwork by S. Hakala / J. Dirig
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Bog Spavin

- The horse usually is not lame unless the condition is complicated by bone involvement.
- The primary distention of the joint capsule is on the dorsal medial surface of the hock, while smaller swellings develop on each side of the proximal caudal aspect.
- Uncomplicated bog spavin rarely interferes with the usefulness of the horse but is an unsightly blemish and indicates the need for radiographic evaluation.
- The distention may spontaneously appear and disappear in weanlings and yearlings.
Bone Spavin

• Bone spavin is osteoarthritis or osteitis of the hock joint, usually the distal intertarsal and tarsometatarsal articulations, and occasionally the proximal intertarsal joint
• Lesions involve degenerative joint disease, particularly on the craniomedial aspect of the hock with periarticular new bone proliferation, which eventually leads to ankylosis
• Bone spavin usually causes lameness
• Theories to explain this condition include faulty hock conformation, excessive concussion, and mineral imbalance
• All breeds can be affected, but it is most prevalent in Standardbreds and Quarter Horses.
A bone spavin is caused by bone proliferation around the lower joints of the hock.

- cannon bone
- synovial membrane
- fibrous joint capsule
- the joint cavity filled with synovial fluid
- sesamoid bone
- cartilage
- long pastern bone
Bone Spavin

- The lame horse tends to drag the toe
- The forward flight of the hoof is shortened, and hock action is decreased
- The heel may become elongated
- Standardbreds develop soreness in the gluteal musculature (so-called trochanteric bursitis - secondary to spavin.
- In advanced cases, the bony proliferation may be visible on the distal craniomedial aspect of the hock
- When standing, the horse may rest the toe on the ground with the heel slightly raised
- Lameness often disappears with exercise and returns after rest.
HOCK AND METATARSAL DISORDERS

Cow-hocked conformation predisposes the horse to bone spavin.

Increased thermal gradients are seen which closely follow the joint spaces in this thermograph.

The spavin test involves flexing the hock 3 - 4 minutes, then trotting the horse which will exaggerate the lameness seen in bone spavin.

This radiograph reveals narrowed joint spaces, sclerosis and osteophytic formation.

Intraarticular nerve blocks will localize bone spavin pain to the hock joints.

Artwork by S. Hakola / J. Dirig
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Bone Spavin

- The spavin test (ie, trotting after limb flexion for ~60 sec) may be a useful aid to diagnosis but is not specific for this condition or even this joint
- In so-called occult spavin, there are no visible or radiographic exostoses
- Local anesthesia of the individual tarsal joints is necessary to localize the exact site of pain responsible for the lameness.
Bone Spavin

- The disease is self-limiting, ending with spontaneous ankylosis of the affected joint(s) and a return to soundness
- In the early stages, intra-articular injection of corticosteroids or sodium hyaluronate (or both) may be beneficial
- NSAIDs (phenylbutazone) eliminate or reduce the clinical signs
- Working the horse after this treatment is aimed at accelerating ankylosis and resolution of lameness
- Surgical arthrodesis - another means to accelerate ankylosis of the joint
- Cunean tenotomy is commonly used - of questionable value by itself
- Deep-point firing used to be advocated for hastening ankylosis, but it is doubtful that it has any beneficial effect beyond encouraging rest
- Corrective shoeing - raising the heels and rolling the toe - may help but is unlikely to eliminate lameness on its own.
Capped Hock

• Capped elbow and hock are inflammatory swellings of the subcutaneous bursae located over the tuber calcaneus
• Trauma from lying on poorly bedded hard floors, kicks, falls, riding the tailgate of trailers, iron shoes projecting beyond the heels, and prolonged recumbency are frequent causes.
• Circumscribed swelling develops over and around the affected bursa.
• Lameness is rare.
• Bursa may be fluctuating and soft at first but, in a short time, a firm fibrous capsule forms.
• Initial bursal swellings may be hardly noticeable or quite sizable.
• Chronic cases may progress to abscessation.
HOCK AND METATARSAL DISORDERS

Surgical ankylosis using drill bits to destroy the joint spaces

Infrared thermograph depicts an increased focal gradient around the plantar ligament

Clinical appearance of the sprained plantar ligament

Intramuscular injection of polysulfated glycosaminoglycans

Therapeutic ultrasound and warm moist heat are two of the physical therapy modalities utilized to treat curb

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Capped Hock

• Acute early cases may respond well to applications of cold water...
• Followed in a few days by aseptic aspiration and injection of a corticosteroid.
• Bursa may also be reduced in size by application of a counterirritant or by ultrasonic or radiation therapy
• Older encapsulated bursae are more refractory
• Surgical treatment (usually curettage and drainage) is recommended for advanced chronic cases or for those that become infected
• A shoe-boil roll should be used to prevent recurrence of a capped elbow if the condition has been caused by the heel or the shoe
• With capped hock, behavioral modification so the horse does not kick the stall offers the only hope of permanently resolving the problem.
Curb

• Curb is a thickening or bowing of the plantar tarsal ligament due to strain
• This ligament may become inflamed and thickened after falling, slipping, jumping, or pulling
• Most common in Standardbreds, in which poor conformation of the hock is a predisposing factor
• Seen as an enlargement over the caudal surface of the fibular tarsal bone ~4 in. (10 cm) below the point of the hock
• It is easily seen when observing the horse from the side.
Curb

- A recently formed curb is associated with acute inflammation and lameness
- Horse stands and favors the limb with the heel elevated
- In chronic cases, there is rarely any lameness or pain
- If the curb is due to / accompanied by acute inflammation, cold packs and rest can help
- Little can be done to overcome the curb that is secondary to poor conformation
- Problem is self-limiting, without lasting effects on performance
Thoroughpin

- Thoroughpin is a distention of the tarsal sheath of the deep digital flexor tendon just above the hock
- It is characterized by fluid-filled swellings visible on both medial and lateral sides proximal to the tibiotarsal joint, which distinguish it from bog spavin
- It is usually unilateral and varies in size
- Thoroughpin is referred to as a tenosynovitis of traumatic origin, but it may not be associated with any detectable inflammation, pain, or lameness
Thoroughpin

• It is a blemish and so is of clinical importance in show horses
• Treatment is by withdrawal of the fluid and injection of hyaluronic acid or a long-acting corticosteroid
• May need to be repeated until the swelling does not recur
• Radiation therapy also helps reduce the secretory property of the tendon sheath
Rupture of the peroneus tertius muscle

Ultrasound as seen in thoroughpin showing fluid in the deep digital flexor sheath

Warm moist heat pack applied to the hock reduces the inflammatory swelling seen in thoroughpin.
Stringhalt

- Stringhalt is a myoclonic affliction of one or both hindlimbs seen as spasmodic overflexion of the joints.
- The etiology is unknown, but lesions of a peripheral neuropathy have been identified in the sciatic, peroneal, and tibial nerves.
- Horses of any breed may be affected; it is rare in foals.
- All degrees of hyperflexion are seen, from the mild, spasmodic lifting and grounding of the foot, to the extreme case in which the foot is drawn sharply up until it touches the belly and is then struck violently on the ground.
- In severe cases, there is atrophy of the lateral thigh muscles.
Stringhalt

• Mild stringhalt may be intermittent
• Signs are most obvious when the horse is sharply turned or backed
• In some cases, the condition is seen only on the first few steps after moving the horse out of its stall
• Signs are often less intense or even absent during warmer weather.
• Stringhalt is regarded as unsoundness, but may not materially hinder the horse’s ability to work, except in severe cases when the constant concussion gives rise to secondary complications
• The condition may also make the horse unsuitable for equestrian sports
Stringhalt

- Diagnosis is based on clinical signs but can be confirmed by electromyography
- If the diagnosis is in doubt, the horse should be observed as it is backed out of the stall after hard work for 1-2 days
- False stringhalt sometimes appears as a result of some temporary irritation to the lower pastern area or even a painful lesion in the foot
- The occasional horse with momentary upward fixation of the patella may exhibit a stringhalt-like gait (??)
Stringhalt

- Many of these cases apparently recover spontaneously
- In chronic cases, tenectomy of the lateral extensor of the digit, including removal of a portion of the muscle, has given best results
- Improvement may not be evident until 2-3 wk after surgery
- Prognosis after surgery is guarded—not all cases respond
- Other methods of treatment include large doses of thiamine and phenytoin.
HOCK AND METATARSAL DISORDERS

Stringhalt, Capped Hock

Characteristic overflexion of the hindlimb as seen in stringhalt.

Surgical resection of the lateral digital extensor tendon.

Clinical appearance of capped hock shows a fluid-filled swelling.
Sweeney
Shoulder Atrophy, Slipped Shoulder

• Sweeney is either disuse atrophy or neurogenic atrophy of the supraspinatus and infraspinatus muscles
• Disuse atrophy, sometimes involving the triceps also, follows any lesion of the limb or foot that leads to prolonged diminished limb use
• Neurogenic atrophy is due to damage to the suprascapular nerve, which supplies the supraspinatus and infraspinatus muscles
• Polo ponies are occasionally affected because of collision during competition
• Draft horse sweeney...??)
• If the trauma is not evident, pain may be absent, and lameness may not occur until atrophy develops.
• If injury is evident, there may be some difficulty in extending the shoulder.
• As atrophy progresses, there is a noticeable hollowing on each side of the spine of the scapula, especially in the infraspinous area, resulting in prominence of the spine.
• Because the tendons of insertion of the two affected muscles act as lateral collateral ligaments to the humeroscapular joint, atrophy of the muscles leads to a looseness in the shoulder joint.
• In severe cases, this is sometimes erroneously diagnosed as a dislocation.
The affected limb, when advanced, takes a semicircular course and, as weight is borne by the limb, the shoulder joint moves laterally (shoulder slip).

Treatment for disuse atrophy consists of removing the cause of the failure to use the limb.

For neurogenic atrophy, massage with stimulating liniments or by an electrical vibrator may be of benefit.

Rhythmic muscular contractions by faradism have maintained muscle bulk until the nerve regenerates.

Surgical release of the suprascapular nerve from scar tissue impingement, by “notching out” the rostral border of the scapula, has also been recommended.
• The prognosis for cases of disuse atrophy depends on removal of the primary cause
• In neurogenic atrophy, the prognosis is guarded; mild cases should recover in 6-8 wk
• When damage to the nerve has been severe, spontaneous recovery may take many months, if it occurs at all
• Such cases are candidates for surgical release
• If the nerve has been severed, recovery is unlikely
Navicular Disease

- Navicular disease is a chronic degenerative condition of the navicular bursa and navicular bone
- involves damage to the flexor surface of the bone and the overlying deep digital flexor tendon
- With osteophyte formation on the lateral and proximal borders of the bone
- It is a syndrome with a complex pathogenesis rather than a specific disease entity
- One of the most common causes of chronic forelimb lameness in horses but is essentially unknown in ponies and donkeys
This horse’s heel pain was most likely caused by three factors: Remodeling of the navicular bone in response to chronic stress (1); a cystlike lesion at the point where the impar ligament attaches to the coffin bone (2); remodeling of the bone near the cyst (3).
Navicular Syndrome
Navicular Syndrome

Weight Bearing

Activates navicular bone

Compression of navicular bone

Abnormal increase in bone density

Cartilage degeneration, especially on flexor surface

Abrasion of flexor tendon by eroded cartilage

Navicular Bursitis?

Tension of supporting ligaments

Fracture?
Navicular Syndrome

Weight Bearing

Activates navicular bone

Compression of navicular bone

Ligament strain & Inflammation, especially At bottom

Reduced blood flow To & from navicular bone

Cavities ("flasks" or "lollipops") along lower edge

Tension of supporting ligaments

New bone Production at Sides ("canoeing")

Tearing of Ligament(s)?

Compensation from Vessels at upper edge

Increased blood Pressure within navicular bone

Loss of bone Density around vessels
NAVICULAR SYNDROME

• Contributing factors:

I. Foot shape
   – Long toes, low heels
   – Narrow, upright feet
   – Improper trimming, shoeing

II. Activity
NAVICULAR SYNDROME

**Signs**

- Appears slowly
- Lameness gets progressively worse
- Horse tries to land toe first
- Intermittent lameness
- Heels contract & rise
NAVICULAR SYNDROME

Treatment

• Shoeing

• Training

• Drugs
  – Vasodilators
  – Anti-inflammatory

• Surgery – Palmar Digital Neurectomy
Navicular Disease

- Exact cause is unknown, but it is likely to be multifactorial
- Involves the navicular bone and its blood supply, the suspensory ligament, the distal phalangeal joint, the navicular bursa, and the deep digital flexor tendon
- Considered to be a disease of the more mature riding horse, but radiographic signs have been seen in 3-yr-olds
- May be partially hereditary
- Associated with upright conformation of the forefoot
- Conformation of the foot in chronic cases becomes abnormal; it is upright and narrow and has a small frog
- Defective shoeing that inhibits the action of the frog and the quarters may be contributory
Navicular Disease

- Concussion between the flexor tendon and the navicular bone causes a local bursitis that leads to hyperemia and rarefaction of the bone with resultant alteration of the flexor surface of the bone
- Usually, the disease is insidious in onset
- Attention is first directed to the affected foot or feet by the attitude of the horse when at rest
- Horse relieves the pressure of the deep digital flexor tendon on the painful area by pointing or advancing the affected foot with the heel off the ground - both forefeet affected, they are pointed alternately
Navicular Disease

- Intermittent lameness is manifest early in the course of the disease
- Stride is shortened, and the horse may tend to stumble
- A flexion test, involving the distal forelimb, usually produces a transient exacerbation of lameness
- There may be soreness in the brachiocephalic muscles secondary to the changes in posture and gait, thus the frequent complaint of “shoulder lameness”
- Because the condition is both chronic and degenerative, it can be managed in some horses but not cured
- With severe lameness, rest is indicated
Navicular Disease

- Foot care is directed to trimming and shoeing that restores normal phalangeal alignment and balance
- Thinning the quarters with a rasp and proper hoof moisturization may relieve hoof contraction
- Assist hoof expansion, but the normal angle must be maintained and only three nails used in each branch; a fourth nail in the heel will nullify the slipper effect
- Toes should be rounded to facilitate the “break-over”
- NSAIDs (phenylbutazone), along with proper foot management, extend serviceable soundness in some horses
- Intrabursal injection of corticosteroid also is more palliative than curative
Navicular Disease

- Neurectomy may render relief from pain and prolong the usefulness of the horse, but no neurectomy should be considered curative.
- Digital neurectomy can be accompanied by severe complications such as painful neuroma formation.
- A technique of desmotomy of the collateral sesamoidean ligament has also been described.
  - By cutting this ligament, the concussive forces between the navicular bone and the deep digital flexor tendon are thought to be reduced.
- Although the prognosis is guarded to poor, a carefully designed therapeutic regimen can prolong the usefulness of most horses.
- Over months or years, all affected horses reach a point of nonresponsiveness to treatment.
Figure 1.3. Topography of the solar surface of the hoof. The right half has been trimmed to emphasize the region of the white line.
Hoof Wall

• Made up of keratinized epithelial cells
• Cells are arranged in tubules and run from coronary band to ground surface
• Thickest at toe becoming thinner at quarters (sides)
• Contains pigment
Hoof Wall

• **Function:**
  – Weight-bearing surface of the hoof
  – Helps retain moisture
  – Protect internal structures of the foot
Laminae

• Two Layers:
  – **Insensitive**-forms inner layer of hoof wall
  – **Sensitive**-covers surface of coffin bone, acts as attachment for hoof wall and coffin bone, and acts as main area of circulation within foot
  – White Line-yellowish area where layers intermesh
Bars

• Where hoof wall is reflected back toward toe
• Located in heel area of hoof

• Function:
  – Prevent over-expansion of hoof wall
Sole

• Covers bottom of coffin bone
• Sensitive
• Self-limiting growth
  – Sloughs off when thickness > hoof wall
• Concave at ground surface
  – Shape prevents sole from directly bearing weight
• Easily bruised
  – Occurs when bearing weight: heavy riders, “flat feet”
Frog

• Occupies area between bars
• Wedge-shaped
  – Apex — point of frog
  – Cleft—ridge in rear portion of frog
• Sensitive
• Produced by papillae
• Elastic
  – Moisture content ~ 50%
  – Greasy secretions from fat glands bet. digital cushion and frog
Digital Cushion

- Also called plantar cushion
- Fleshy “heel”
- Back half of hoof
- Fibro-elastic, fatty

**Functions:**
- Shock absorber for foot
- Pumps blood from foot back to heart
Bones

• Three Bones:
  – Short pastern
    • Partly in and partly above hoof
  – Navicular bone
    • Smallest bone
    • Increases articular surface and movement of coffin bone
Coffin bone

- Location-to the front and slightly to outer side of hoof
- Largest bone
- Provides shape to foot and rigidity needed for weight-bearing
- Resembles miniature hoof in shape
The Horse’s Second Heart

What do I mean??

The Hoof, of course!
How?

• Blood is pumped to the hoof from the heart through arteries

• With each step, pressure is put on the veins in the plantar cushion of hoof which pumps the blood back to the heart

• As this pressure is released, the blood flows back to the hoof through the arteries by a combination of heart pulses and gravity
Lameness

• Most lameness can be prevented

• How?
  – Proper foot care and management
Healthy Hooves

• Frog is a good indicator of foot health
• Daily maintenance prevents lameness
• Good foot care should include:
  – Regularity--Routine cleaning
  – Frequency--Periodic trimming
  – Cleanliness
  – Use of proper corrective measures--Corrections and treatment
Routine Cleaning

• Includes use of:
  – Hoof pick
  – Fine-bristled wire brush

• Always clean from heel toward toe

• Do not apply too much pressure with either tool. This can cause:
  – Damage-bruising, abcess, infection, etc.
  – Disturbance of moisture balance
Trimming

• Goal:
  – To maintain proper shape and length of the hoof

• Hooves should be trimmed every 4-6 weeks depending on usage of your horse

• Tools:
  – Hoof knife
  – Nippers
  – Rasp
What causes lameness?

• Stone in the foot-
  – Stones lodge between shoe and frog

• Bruised sole-
  – Direct injury of flat of foot by stones or irregular ground

• Corns-
  – Bruising of sole between bar and hoof wall
  – Caused from poorly fitted shoes or neglect to reshod regularly
Causes continued...

• Pricked foot or Puncture wounds-
  – Result from foreign objects entering sole (stone, glass, wire, etc.)
  – Foreign objects can stay in foot for as long as a year

• Hoof cracks-
  – Occur mostly in dry or untrimmed hooves
  – Can also be caused by injury of hoof forming tissue

• Thrush-
  – Bacterial infection of frog and sole due to irregular cleaning and dirty conditions
Causes continued...

• Laminitis-
  – Inflammation of laminae
  – Caused by overeating of grain, ingestion of cold water by a hot horse, retained afterbirth, overfatness, idle horse on a lush pasture

• Navicular disease-
  – Caused by injury to navicular bone
  – Common in breeds with genetic defects in conformation
  – Increased probability with heavy use on hard ground
ACUTE LAMINITIS

• Sudden
• Shifting weight
• Stilted, shuffling gait
• Fore feet extended – hind feet under the center of the body
• Reluctant to move
LAMINITIS - FOUNDER

• Prognosis
  – 30% return to soundness
  – 10% intermittently lame
  – 10% permanent severe lameness
  – 50% death
ACUTE LAMINITIS

- Resists lifting feet
- Elevated heart rate
- Sweaty
- Distressed
- Strong digital pulse
CHRONIC LAMINITIS

• Pressure on the sole from a rotated or sunken pedal bone
• Breakdown of the hoof wall-pedal bone bond
• Permanent changes in blood supply to the hoof wall
CHRONIC LAMINITIS

More susceptible to:
- Sole bruises
- Abscesses
- Flaring & separation of the wall at the toe
- Infection beneath the separated wall
- Hoof wall cracks
- Degeneration of the tip of the pedal bone
- Chronic lameness
- Slowed hoof wall growth
LAMINITIS – FOUNDER
Contributing Factors

• Bacterial Toxin
  – Colic
  – Colitis
  – Potomac Horse Fever
  – Pleuropneumonia
  – Endometritis
  – Water founder
  – Postoperative colic
  – Black walnut wood shavings
LAMINITIS – FOUNDER
Contributing Factors

• Carbohydrate overload
• Severe dehydration or shock
• Corticosteroids
• Pituitary gland dysfunction in older horses
• Extreme load
• Repeated concussion ("road founder")
• Stress related
LAMINITIS - TREATMENT

• Prevent or limit coffin bone rotation
  – Frog support
  – Wedges & trimming
  – Reverse shoes
  – Deep bedding
  – Restricted exercise
  – Surgery
LAMINITIS TREATMENT

• Relieve the pain
  – Medications
  – Poultices
  – Nerve blocks

• Improve blood flow in feet
  – Medications