University of Mosul
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Lecture title: lameness

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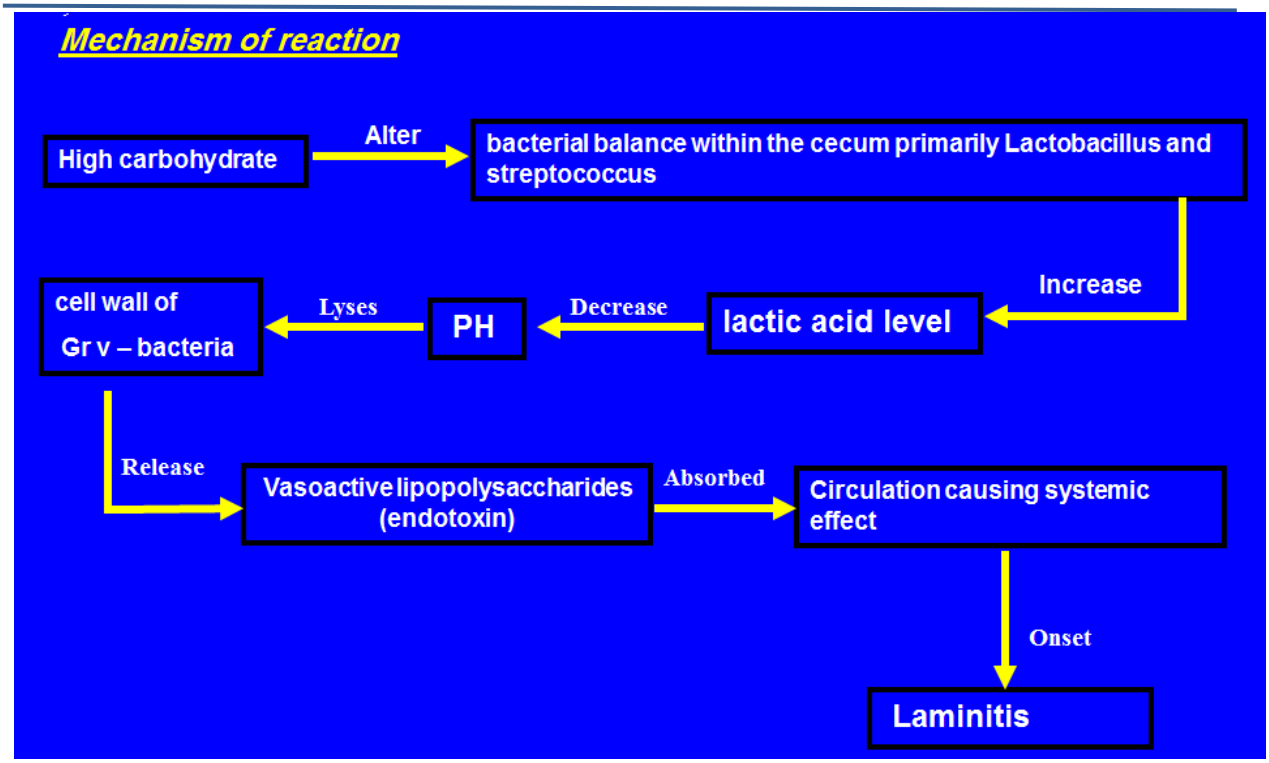
Summary:

Laminitis(Founder)
Inflammation of the laminae of the foot. But really it is a complicated, interrelated events that results in varying degrees of foot pathology. Resent research suggests that laminitis is in fact peripheral vascular disease manifested by decreased capillary perfusion within the foot, significant amount of ateriovenous ischemic necrosis of the laminae, and pain, related to systemic metabolic disorder that affects the cardiovascular, renal and endocrine system, blood coagulation and acid base condition.

Etiology:-
1- Ingestion of toxic amount of grain (grain founder),
ingestion of greater quantities of grain such as wheat,
corns and barley, which are rich with high carbohydrate level.

Typical attitude of a horse with laminitis. The hind feet are carried up forward to help take more weight off forefeet, which are extended cranially.



2- Ingestion of large amount of cold water by overheated horse is considered a cause of laminitis. Although this phenomenon is not fully understood, it may be due to gastroenteritis or colitis. Horses that are overheated should be allowed only small amounts of water until they have cooled.
3- Concussion :- This type of laminitis is the result of concussion to the feet from hard work or fast work on hard surface.

4- Endometritis or severe systemic infection(posparturant laminitis). A mare may develop this type of laminitis shortly after foaling as a result of infection arising from retention of part of fetal membranes or of a uterine infection. Laminitis may occurs as a results of severe pneumonia or other systemic infections.
5- Obesity and ingestion of lush grass pasture. It is common in horses grazed on grass pastures particularly that contain clover and alfalfa which are more likely to cause the condition more than other grass pastures. The cause of this type of laminitis is unexplained, but hormonal factors may be an etiologic agent in some cases if grasses or legumes contain estrogen.

6- Hypothyroidism has also been considered a possible cause of laminitis, low T3 and T4 level in serum.
7- Miscellaneous causes, which includes:-
A-Hormonal imbalance particularly in mares.
B-Following viral respiratory diseases.
C-Following administration of some drugs.

Clinical Sings:-(Acute laminitis)

1-Acute laminitis may affect both front feet or all four feet.
2-If all four feet are affected the horse tend to lie down for extended period.
3-Most commonly only the two front feet are involved, in this case the hind feet are carried well up under the body and the front feet are placed forward with the weight on the heel of the foot. The horse show great reluctance to move.
4-Heat is present over the wall of the coronary band.

5-There is increased digital pulse.
6-Increased respiration and elevation of temperature and congested mucous membrane.
7-It is often difficult to lift one foot from the ground.
8-By using a hoof tester, a uniform tenderness will be noted over the entire area of the sole.

Chronic Laminitis

1-Laminitis becomes chronic after 48 hours of continual pain or when rotation of the distal phalanx occurs.
2-Severe lameness may not be present after the acute phase, but an acute recurrence may occur.
3-When rotation of the distal phalanx occur it can vary from mild to severe.
4-By examination of the sole, a semicircular separation of the sole just dorsal to the apex of the frog may be noted, indicating that the tip of the distal phalanx is beginning to penetrate the sole.

5-The hoof wall grow more rapidly than normal and may develop a long toe, and also a heavy ring formation on the hoof wall is seen.
6-Seedy toe resulting from separation of the laminae is usually present in chronic laminitis.
7-Hoof tester examination in the chronic phase rarely painful response.

This horse has had chronic laminitis for some time. Note the spaces between the rings at the heels are wider than those at the toe.

Diagnosis:-

1-By the typical easily remarkable sings of acute laminitis.
2-Typical attitude of the animal.
3-Increased pulsation of the digital arteries and heat of the foot.
4-Hoof tester prove the acute phase of laminitis.

5-In chronic phase a serial radiographs should be taken from 48-72 hours after the acute onset of laminitis, to monitor the progress of rotation of the distal phalanx, which is identified by divergence of the bone in relationship to the hoof wall.

Treatment:-

1-Laminitis is considered a medical emergency and treatment for complete recovery should begin prior to rotation of the distal phalanx. The treatment should be initiated within 24 hours after the first onset of lameness, because rotation of the distal phalanx can be observed within 48 hours period.

Developmental phase:-

1-In grain overload, the treatment is directed at neutralizing the effects of the ingested grain and controlling the developmental phase of laminitis. Often the sings of laminitis from this cause do not appear for 12-18 hours after ingestion of the grain, the treatment to clear the intestinal tract is used before the sings of laminitis have yet appear. Mineral oil is commonly used, which act as a bulk laxative and also coat the wall of the intestine perhaps inhibiting absorption of toxins. The treatment can be repeated at 4-6 hours intervals until all grain has been removed from the intestinal tract.

2-Provide short period exercise during the acute onset(10 min./ hour) for the first 24 hours, this will increase the flow of blood through the foot. But it is contraindicated after digital pathology progresses.
3-Heparin an anticoagulant has been used successfully to prevent laminitis, at a dose of 100 units/ kg given i/v four times a day.
4-Acepromazine I/M 4 times .
5-Flunixin meglumine may be beneficial in the prevent and treatment of laminitis because of its anti endotoxic effect. It is given at a dose of 1.1mg/kg 3 times daily for 3-5 days.
6-In case of septicemia, retained placenta and or Endometritis antibiotics should be added to the previous treatment.

Acute phase:-

1-Using of analgesics and the best one is phenylbutazone at high doses, 4.4mg/kg by I/V rote, since it has an antiplatlet effect may prevent the coagulopathy and the analgesic effect.
2-Using of acepromazine to reduce vasoconstriction and produce analgesia of pain.
3-Horse should be placed in stalls with soft sands underfoot, this serves to support the ground surface of the sole and allows the horse to stand in a more comfortable position.
4-Administration of corticosteroids and antihistamines have been recommended in the past, but recently it is proved they are probably of little benefit in the acutely affected horses.
5-Using of hot and cold soaks.
6- Mild exercise recommended for the first 24 hours after the acute onset laminitis.
7- Prevention of distal phalanx rotation either by application of plaster of paris or using of

silicone padded shoes.
8- Eliminate grain from the diet and giving a good quality of legumes or grass hay.
9- Injection of diuretics will reduce congestion in the feet.
10- Ketoprofen analgesic used successfully in the acute phase of laminitis in a dose of 2.2mg/kg four times daily.
11- More recently a pentafusion analgesic drug are used to decreasing the level of pain. Pentafusion is a combination of drugs which includes Ketamine, Morphine, Lidocaine, Detomidine, and Acepromazine.

Chronic phase:-
1-Grooving the hoof wall or rasping the quarters to thin the wall and provide their expansion.
2-When infection is present in the sensitive laminae due to sole perforation, the foot should be treated daily by removing the dead and necrotic tissues, local application of Tr. Iodine and bandaging the foot until the infection is over.
3-Foot trimming and reshaping the hoof by rasping it, to lower the heel so that the distal border of the third phalanx will parallel the surface of the ground when the foot is bearing weight.
4-Neurectomy of the digital nerve sometimes used to reduce the pain.

Tendinitis, Tendosynovitis (Bowed Tendon, Tendovaginitis)

-Tendinitis is inflammation of tendon and tendon- muscle attachments. In the horse it refers specifically to inflammation of the flexor tendons due to excessive strain. -The term tendinitis, if used correctly, applies to strain –induced inflammation involving tendon that is surrounded by paratendon and not tendon sheath. If the region of involved tendon is associated with a tendon sheath the term Tendosynovitis is used.
-Tendinitis and tendosynovitis are most common in the forelimb in racing Thoroughbreds and Quarter Horses and typically involve the superficial digital flexor tendon.

Tendinitis or tendosynovitis has also been classified according to position:-
1-High- just distal to the carpus or tarsus.
2-Middle- in the middle third of the metacarpus or metatarsus.
3-Low- distal third of the metacarpus or metatarsus.

Etiology
1-Tendinitis or tendosynovitis usually results from a severe strain to the flexor tendons which associated with excessive loading and overstretching of the tendon.
2-The higher incidence of the disease in race horses and hunters compared with other horses confirms that the injuries are directly related to excess physical stress.

3. The most common site of injury is in the central metacarpal region where the superficial digital flexor tendon has its smallest cross-sectional area.

4. Abnormal angulation of the fetlock associated with muscle weakness or conformation increases the stresses on the tendon.
5. Uneven and slippery ground or sudden turns may load one side of a tendon, in addition to other fatigue factors.

Pathophysiology of Tendinitis and Tendon Injury:-

1-Tendon injury and degeneration occurs in all degrees of severity ranging from slight subclinical injuries that may be detected only thermography up to those associated with complete tendon rupture.
2-Loads above the safe limit may produce minor fiber displacement and rupture. This separation results in capillary hemorrhage within the tendon.
3-Typically, acute tendon injury is accompanied by hemorrhage, edema, fibrin accumulation, and local swelling.

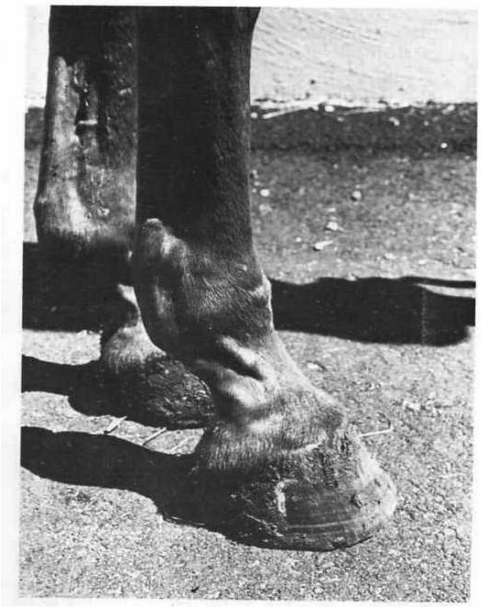
4. Transudation and hemorrhage into the tendon separates and weakens remaining normal fibers.
5. Hydrolytic enzymes are also released and can cause further damage to collagenous fibrils and interfibrillar matrix.
6. Disruption of blood supply in the damaged region also occurs. The amount of necrosis occurring in the region can be related to the degree of vascular compromise.

Diagnosis:-

1-In the acute phase, there is diffuse swelling over the region with heat and pain on palpation.
2-Severe lameness is present, and the limb is held in a flexed position.
3-Major disruption of tendon fibers or stretching of the tendon will be represented by dropping of the fetlock.
4. The chronic stage is manifested by fibrosis and hard swelling on the palmer or planter aspect.
5. The horse may be sound at the walk and trot but becomes lame with hard work.
6. Anular ligament constriction may be present in association with a chronic bow at the level of the fetlock.
7. Thermography may be useful to diagnose early inflammation in the tendons when other clinical sings are not obvious.
8. Tendinography using of air tendograms will provides additional information about bowed tendon. Air is initially injected into the digital flexor tendon sheath and then subcutaneously between the flexor tendons to outline them.
9. More recently, diagnostic ultrasound has been used to define of damage in a tendon as well as the degree of adhesion formation.

Tendosynovitis (bowed tendon). Note the extensive swelling above the sesamoid bones in the area of flexors. This involvement includes all of the classification of high, middle and low tendinitis.

Chronic low tendinitis(bowed tendon) of the left forelimb. Notice extent of swelling from the superficial flexor encompassing the deep flexor. This indicates tearing and adhesions of the common sheath. The left fetlock dropped lower than the right when the horse walked.



Constriction of the palmer anular ligament. Note distention of digital flexor tendon sheath above the anular ligament.

Treatment:-

1-In the acute case the aim of the therapy is minimize inflammation, so initial therapy includes the application of cold hydrotherapy or ice-packs to minimize hemorrhage and edema.
2-Immobilization using either a plaster cast or soft casting.
3-The use of parenteral corticosteroids as well as nonsteroidal anti-inflammatory drugs has been advocated.
4. Peritendinous injection corticosteroids may be used to minimize Peritendinous adhesions, but intratendinous injection is contraindicated.
5. Topical dimethylsulfoxide may be of value in reducing edema.

6. Corrected shoeing with raised heels has been recommended.
7. An important aspect of treating tendinitis is rest, it may be better that complete rest is given for the first two weeks.
8. For chronic tendinitis, the most common forms of treatment have included some form of Counterirritation, including firing, surface or injected irritants, irradiation, ultrasound, and surgical incision of the tendon.
9. Other treatments of chronic tendinitis, include tendon transplants, implantation of artificial tendon sheaths, and carbon fiber implants.