Osteoarthritis and Lameness Evaluations

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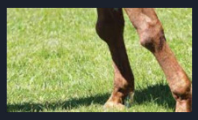
- Lameness major cause of wastage in horses
- Osteoarthritis (OA) number one cause of lameness
  - 33% of all horses have OA changes (Schueter and Orth)

Etiology of OA

- OA - degenerative joint disease (DJD)
- Characterized by deterioration of articular cartilage, accompanied by changes in bone and soft tissues of the joint
- Results in net loss of articular cartilage
  - Causing:
    - Pain
    - Deformity
    - Loss of motion
    - Decreased function



Etiology of OA - Synovial Joints

- Joints typically associated with lameness
  - Two major functions
    - Enable movement and transfer load
- Consist of:
  - Articulating surfaces of bone covered by articular cartilage
  - Secured by a joint capsule and ligaments
  - Cavity containing synovial fluid
- Articular cartilage is avascular
  - Serves as a shock absorber for bone
  - Frictionless surface bathed in synovial fluid

Etiology of OA - Subchondral Bone

- Bone under the articular cartilage
  - Remodels rapidly
- Responsible for changing shape and congruity of the joint
- Mechanical stimulation leads to micro-damage
  - Results in either:
    - Normal remodeling
    - Excessive remodeling prerequisite to sclerosis
      - Sclerosis - increase in bone density
    - Accumulation of micro-damage leading to gross fracture
- Subchondral bone thickening is normal response to exercising
  - An increased degree of subchondral bone sclerosis corresponds to greater degree of OA
  - Sclerosis of the subchondral bone can lead to chip fractures or osteochondritis dissecans (OCD) and slab fractures

Etiology of OA - Soft Tissue

- Soft tissue anatomy:
  - Intra-articular ligaments
  - Joint capsule
  - Menisci
  - Synovial membrane
- Intra-articular ligaments
  - Provide support for the joint and distribute normal surface stress
  - Damage can stimulate an inflammatory response and change the loading characteristics of the joint surface
- Chronic disease to the joint capsule (capsulitis) can lead to formation of scar tissue and increased stiffness
  - Leading to instability of the joint by changing surface stressors
- Acute synovitis and capsulitis can cause significant clinical compromise of the joint = DJD

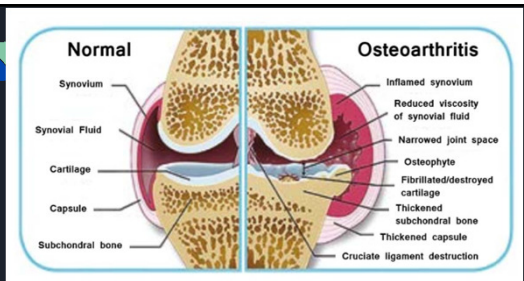
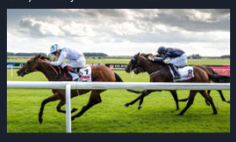


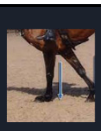
Fig. 1: Joint overview: normal vs osteoarthritic lesions

Causes of Osteoarthritis

- Cartilage damage due to:
  - Trauma usually mechanical in nature
    - Imbalance between load applied and the tissue's capacity to withstand that load
  - Inflammatory and degradative enzymes destroy normal joint environments
  - Impact injuries
  - Abnormal joint loading
  - Excessive wear
  - Preliminary factors may be:
    - Immobilization of joint
    - Poor conformation
    - Improper shoeing/trimming



Causes of Osteoarthritis



- Most lameness occurs in the forelimbs
  - Carry 60-65% of the horse's weight
  - Hind limbs propel the horse forward, forelimbs receive the shock of landing
- Joints most commonly affected by lameness are:
  - Carpal, fetlock, proximal interphalangeal, and distal intertarsal/tarsometatarsal joints
    - Low motion joints (interphalangeal, distal intertarsal and tarsometatarsal) vulnerable to OA
      - Small area of joint surface to sustain the same load for a relatively longer period of time during joint movement

Trauma

- Very strenuous exercise injures articular cartilage by increasing fibrillation of the cartilage, reducing its cellular content and quality
- Cartilage no longer responds with biomechanical properties
  - Repetitive exercise may induce the replacement of normal subchondral bone by sclerotic bone
- Overload of the joint occurs:
  - Extensive and intensive exercise
  - Fatigue
  - Speed
  - Poor confirmation or footing

Immobilization

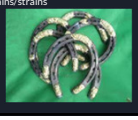
- Reduced loading or immobilization due to the lack of exercise
- Leads to atrophy or degeneration of articular cartilage
- Removal of mechanical stimulation leads to atrophy when:
  - Cartilage is subject to high pressure loads
    - Tissues are compressed and water is expressed from the cartilage
  - Therefore cartilage needs physiological loading and motion to maintain normal nutrition and exchange of synovial fluid

Conformation

- Based on physical appearance and outline of horse dedicated by bone and muscle structures
- Certain conformational traits can predispose horses to lameness
  - Calf knees
  - Knocked knees (carpus valgus)
  - Bowed knees (carpus versus)
  - Bench knees
  - Club foot
  - Hindlimb extremely straight in agulation of stifle and hock
  - Sickle or cow-hocked
- These abnormalities lead to abnormal joint loading

Shoeing/Trimming

- Hoof capsule is malleable
  - Manner in which it is trimmed/shod can affect performance and soundness
  - Can be useful in corrective instances
- Types of shoes and shoeing devices can alter the traction of the hoof
  - Sliding plates and web shoes can provide inadequate traction
    - Result in strained tendons and sprained ligaments
  - Toe grabs, heel calks, and borium can provide too much traction
    - Excessive torque on the limb and joints leading to sprains/strains
  - Sprains and strains can contribute to the development of OA



Age

- Advancing age preliminary factor in OA
- OA is not age dependent though
  - Osteoarthritis is found in 2 year old race horses also

Lameness Evaluation

- Lameness: any alteration of the horse's gait
  - Unbalanced
  - Can manifest as a change in attitude or performance
- Vet Examination:
  - Medical history: exercise, medication, supplements, etc.
  - Visual appearance at rest
  - Hands on exam:
    - Checking for heat, swelling, joint effusion, etc.
    - Hoof tester examination
    - Evaluation of horse in motion

Evaluation of the Horse in Motion

- Walk and trot in straight line on hard flat surface
  - Away from and towards the vet, as well as side views
  - Circles
- Undersaddle work
- Presentation of lameness
  - Shortened stride
  - Foot arc (in motion)
    - Decreased when lame
  - Foot placement
  - Head bob for front limb lameness
    - Sound leg lands – head lower
    - Lame leg lands – head raised
  - Hip elevation on lame leg placement for hind limb

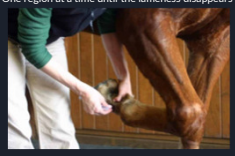
AAEP Lameness Scoring

- Use this for standardizing lameness for records
- Monitoring for improvement after treatment

Grade	Clinical symptoms
0	Sound
1	Lameness difficult to detect and inconsistent. In certain circumstances (such as weight carrying, circling, inclines, hard surfaces) apparent intermittent claudication
2	Lameness difficult to detect, but consistent. In certain circumstances (such as weight carrying, circling, inclines, hard surfaces) apparent sustained claudication
3	Lameness is consistently observable at a trot under all circumstances
4	Obvious lameness with marked head nodding, or shortened stride
5	Lameness is characterised by minimal weight bearing in motion or at rest and the inability to move

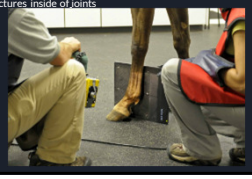
Diagnosing OA

- Diagnostic nerve and joint blocks
  - Analgesic techniques to help identify the location of the lameness
  - Veterinarians will temporarily deaden the sensation to specific segments of the limb
    - One region at a time until the lameness disappears



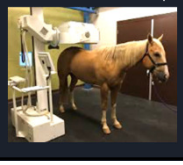
Diagnosing OA

- Radiographs
  - Useful in identifying damage or changes to boney tissue
  - Provide limited information about soft tissue, such as tendons, ligaments, or structures inside of joints



Diagnosing OA

- Scintigraphy (nuclear scanning)
  - Radioisotopes injected intravenously into the horse
    - Isotopes concentrate in areas of injury
  - Horse is scanned with gamma camera to find concentrated areas
- Horse will need to be quarantine for radioactivity after the procedure

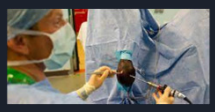


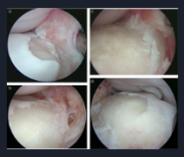
Diagnosing OA

- Ultrasound (sonography)
  - Ultrasonic waves are used to image internal structures
  - Soft tissue visualized

Diagnosing OA

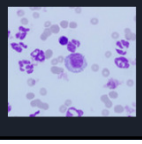
- Arthroscopy
  - Allows visual examination of the inside of the joint or tendon sheath
  - Requires general anesthesia
  - Surgery can be done at the same time if needed





Diagnosing OA

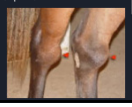
- Collecting samples
  - Blood
  - Synovial fluid (joint)
  - Tissue samples
- Samples examined for infection or inflammation
- Require laboratory testing



Common OA Areas

- Ring bone
  - Term used to describe DJD of the proximal and distal interphalangeal joint
  - Occurs in horses forced to make quick turns and abrupt stops
  - Western performance horse, polo ponies, and jumpers
- Bone spavin
  - Term used to describe DJD of the distal intertarsal, tarsometatarsal and proximal intertarsal joints
  - Common hind limb lameness
  - Found in variety of breeds and disciplines



Management of OA

- Non-steroidal anti-inflammatory drugs
  - Phenylbutazone (Bute)
  - Equioxx/Previcox (firocoxib)
  - Meloxicam
  - Ketoprofen
- Effective in eliminating discomfort and is a first line therapy in minor musculoskeletal pain
- Works by affecting the inflammatory cascade and down regulating mediators produced in the inflammatory cycle
- Most common side effect:
  - Gastrointestinal ulceration
  - Reduction of kidney perfusion
  - Both side effects can be increased by stress

Joint Supplements - Oral

- Non-regulated by the FDA
- Chondroitin sulfate, glucosamine, MSM, and other various other GAG's can be found
- Glucosamine
  - Sugar compound that is made in the horse's body
    - Incorporated into the molecules, including joint cartilage
    - Not necessary for synthesis of cartilage (body uses glucose for body builder)
    - Studies have found that only 2-5% of glucosamine fed to horses actually is available for them to use
- Chondroitin sulfate (CS) sugar molecule found in cartilage, bone, tendons, and ligaments
  - Comes from animal sources: cows, chicken, pork
  - May have variations in absorption

Joint Supplements - Oral

- Probiotic very important when feeding oral joint supplements
- Check bioavailability of your joint supplement
  - Bioavailability: the extent a substance or drug becomes completely available to its intended biological destination(s)
- Examples:
  - Platinum CJ
  - Cosequin ASU

Joint Supplements - Injectable

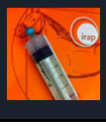
- Goal for systemic and intra-articular therapy is to stop the problems before they occur rather than wait for abnormal radiographs
- Adequan (polysulfated glycosaminoglycans)
  - Intramuscular injection
  - Used for cartilage repair
    - Better for use when cartilage damage is present, but no acute joint inflammation
- Legend (hyaluronate sodium)
  - IV injection or IA injection
  - Used for joint dysfunction due to synovitis

Joint Injections - Intra-articular Medications

- Steroids
  - Used best in inflamed joints
  - Allows the joint to start producing lubricating hyaluronic acid (HA) as inflamed tissue will not produce viscous or thick lubricating HA
- Hyaluronic Acid
  - HyVisc, Hyalovet, Polyglycan
  - HA is normally made by the synovial membrane and is the main lubricant in the joint
  - Higher molecular weight (thickness) of HA provides the most benefit
- Synthetic joint lubricant- Noltrex
- Arthramid - 2.5% polyacrylamide (PAAG) Hydrogel
  - Used for management of all stages of non-infectious SA and DJD
  - Encourages ideal level of tissue integration and vessel growth
  - Allows synovium to regain its normal function - producing synovial fluid

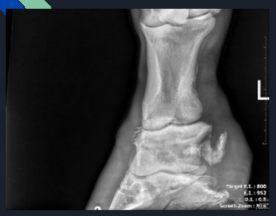
Joint Injections - Biologic Therapies

- Prostide
  - Uses horses own blood to create concentrated solution to amplify the healing process
  - Concentrated solution of platelets, growth factors, and anti-inflammatory cytokines
- Protein Rich Plasma- PRP
  - Centrifuged blood to concentrate the platelets
  - Used for OA and other wounds
- IRAP - Interleukin-1 Receptor Antagonist Protein
  - 50 ml of blood drawn and spun to concentrate WBC
  - Counteracts inflammation- injury/surgery



Conclusion

- OA is a part of equine life
- Trust your veterinarian
- Aggressive treatment of joint disease is indicated to decrease the immediate soft tissue swelling and inflammation and decrease the onset of permanent osteoarthritic changes



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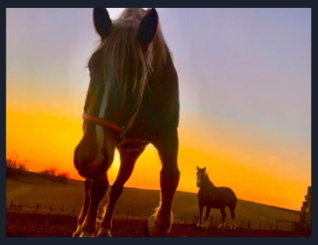
Questions?



Sources

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- *LAMENESS EXAMS: Evaluating the Lame Horse | AAEP.* aaep.org/horsehealth/lameness-exams-evaluating-lame-horse.
- Schueter, Angela E., and Michael W. Orth. "Equine Osteoarthritis: A Brief Review of the Disease and Its Causes." *Equine and Comparative Exercise Physiology*, vol. 4, no. 1, 2004, pp. 221–31. (Schueter and Orth)