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
  - 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
  - Consent of:
    - Articulating surface of bone covered by articular cartilage
      - Secured by 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
    - Normal remodeling
    - Excessive remodeling prerequisite to sclerosis
  - Sclerosis - increase in bone density
    - Accumulation of micro-damage leading to gross fracture
  - Subchondral bone thickening is a normal response to exercising
  - Macrosediment deposits subchondral bone sclerosis can transform the joint and increase the risk 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 to the joint and distribute normal surface stress
    - Damage can stimulate an inflammatory response and change the loading characteristics of the joint
  - Capsular disease to the joint capsule (capsulitis) can lead to formation of scar tissue and increased stiffness
  - Osteoarthritis due to instability of the joint by changing articular stresses
  - Acute synovitis can cause significant clinical compromise of the joint - DJD
**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 (133)
  - Inflammatory and degradative enzymes destroy normal joint environments (122)
  - Impact injuries (122)
  - Abnormal joint loading (122)
  - Excessive wear (122)
- Preliminary factors may be:
  - Immobilization of joint (133)
  - Poor conformation (133)
  - Improper shoeing/trimming (133)

**Most lameness occurs in the forelimbs**

- Carry 60-65% of the horse’s weight (122)
- Most often affect the horse forward, forelimbs receive the shock of landing (122)

**Joints most commonly affected by lameness are:**

- Carpals, fetlocks, proximal interphalangeal, and distal intertarsal/tarsometatarsal joints (122)
- Low motion joints (interphalangeal, distal intertarsal and tarsometatarsal) vulnerable to OA (122)
- Total joint surface to sustain the same load for a relatively longer period of time during joint movement (122)
Trauma

- Very strenuous exercise injures articular cartilage by increasing fibrillation of the cartilage, reducing its cellular content and quality.
- Cartilage no longer maintains 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
  - Splash
  - 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 where:
  - 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
  - Straight hocks (corpus valgus)
  - Splayed knees (corpus varus)
  - Exorbitant
  - Club foot
  - Modified externally straight in abduction of stifles and hocks.
  - 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 used to manipulate toe angle
- Types of shoes and shoeing devices can alter the traction of the hoof
  - Sliding plates and web shoes 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 limbs 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 racehorses

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:
  - Groundwork:
    - Foot arc (in motion)
    - Headset when lame
    - Headset for front/ankle lameness
    - Headset for hind leg - head down
      - Ear/leg lift - head/face
  - Hip elevation on lame leg placement for lateral look

AAEP Lameness Scoring

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

- Very active:
  - Lameness difficult to detect in certain circumstances (e.g., weightbearing, standing, head lowered, apparent improvement)
  - Lameness consistent in certain circumstances (e.g., weightbearing, standing, head lowered, apparent improvement)
  - Lameness inconsistent, minimal, or inconsistent at any scale of circumstances
- Moderate activity:
  - Lameness consistent, minimal, or inconsistent at any scale of circumstances
  - Lameness inconsistent, minimal, or inconsistent at any scale of circumstances
  - Lameness inconsistent, minimal, or inconsistent at any scale of circumstances
- Minimal activity:
  - Lameness inconsistent, minimal, or inconsistent at any scale of circumstances
  - Lameness inconsistent, minimal, or inconsistent at any scale of circumstances
  - Lameness inconsistent, minimal, or inconsistent at any scale of circumstances
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

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

- 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 quarantined 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

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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.
  - Found in Western performance horses, 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 a 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 effects:
    - 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 building).
  - Studies have found that only 2-5% of glucosamine fed to horses can be used for their cartilage.

- Chondroitin sulfate (CS) sugar molecule found in cartilage, bone, tendons, and ligaments.
  - Comes from animal sources: cow, 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
  - Canine ASU

Joint Supplements - Injectable

- Goal for systemic and intra-articular therapy is to stop the problem 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
  - Helps reduce joint inflammation
  - Allows the joint to start producing lubricating hyaluronic acid (HA) as inflamed tissue will not produce HA at a normal rate
- Hyaluronic Acid
  - HyVisc, Hyalovet, Polynovin
  - HA is normally made by the synovial membrane and is the main lubricant in the joint
  - Higher molecular weight (thicker) HA provides more benefit
- Synthetic joint lubricant - Noltrex
  - Arthramid - 2.5% polyacrylamide (PAAG) hydrogel
  - Used for management of all stages of osteoarthrosis and DJD
  - Encourages ideal level of tissue integration and vessel growth
  - Allows synovium to regain its normal function - producing normal fluid
Joint Injections - Biologic Therapies

- **Prostide**
  - Uses horse's own blood to create concentrated solution to amplify the healing process
  - Concentrated solution of platelets, growth factors, and anti-inflammatory cytokines

- **PRP - Protein Rich Plasma**
  - 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
Questions?

Sources

- Lameness and Joint Medications | AAEP. aaep.org/horsehealth/lameness-joint-medications.
- LAMENESS EXAMS: Evaluating the Lame Horse | AAEP. aaep.org/horsehealth/lameness-exams-evaluating-lame-horse.