Common Lameness in Dressage Horses, Risk Factors and Treatment Options

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Lameness Prevalence in Dressage

- Research Questionnaire of 2500 Dressage horses in the UK *
  - Involved 80% non-elite, 11% elite and 9 % unknown level horses
  - 33% had been lame at some point in their career
  - 24% had been lame within the previous 2 years
  - Highest proportion of lame horses were at the elite levels
    - 50% Grand Prix horses
    - 33% Intermediare horses
    - 20% lower level horses
  - Average time off of riding was 3 months, and away from competition was 5 months
  - Elite horses were off for longer than non-elite horses

* Murray et al, 2010, Identification of risk factors for lameness in dressage horses

Lameness Locations

- Over 31% of reported lameness originated in the hoof
- 25% involved the back
- 13% involved the suspensory ligament
- 11% involved the hocks

- Most common was forelimb lameness
- 23% left front, 20% right front, 12% bilateral,
- 12% left hind, 11% right hind, 6% bilateral
- 3% had 3 limbs affected and 1 % had all four limbs affected

General Concepts

- Multiple injuries often present simultaneously
- Horses alter their gait to compensate for one injury, leading to additional stress elsewhere
- The horse's back is commonly the site of compensatory stress and pain
  - Riders may become aware of back pain (secondary) before a lameness (primary)
- Different levels of training predispose a horse to different injuries
  - More collected gaits, weighting the hind end results in increased frequency of hind end injuries
  - Larger heavier horses are more likely to injure limbs as the longer limbs have to handle more pressure and power

The Biomechanics

- Training/Lower levels emphasize balance and freedom of movement
  - Younger horses, with immature musculoskeletal systems
  - Lacking strength, coordination and balance
- Intermediate levels emphasize more lateral movements and some collection
  - Changes in distribution of weight medio-laterally
  - Twisting of joints, bending of vertebrae
- Advanced levels require maximum collection, impulsion and suspension
  - Older horses, more time for wear and tear on joints
  - Most stress is placed on the hind quarters, back and pelvis
  - Maximum range of motion (flexion and extension) of all joints

Common Lameness in Dressage Horses

OA of Coffin Joints (Low Ringbone)

- Common lameness in all performance horses
- Clinical signs (C/S) are a shortened stride
- Most commonly bilateral in FRONT distal joints
- Predisposing factors
  - Weight of the horse, hoof conformation, medial and lateral imbalances
- Diagnosed (DX) by nerve blocks and x-rays
- MRI very useful to diagnose other conditions of the hoof
- Treatment (TX) intra-articular (IA) injections, IRAP, corrective shoeing
- Good prognosis

Back Pain

- Three main sites: Thoracolumbar (T/L), Lumbosacral (L/S) and Sacroiliac (SI)
- C/S: Poor performance, unwillingness to perform certain movements, lack of impulsion, stiffness
- DX: nuclear scintigraphy (bone scan), ultrasound, x-rays
- TX: steroid or anti-inflammatory injections, bisphosphonates, modification of exercise program, complimentary therapies
- Prognosis is fair to good, recurrence is likely
- In the study, back pain was the lameness the least likely to be examined by a veterinarian

Proximal Suspensory Desmitis (PSD)

- Hindlimb PSD most common in more advanced level horses
- May be unilateral or bilateral
- Bilateral cases are difficult to diagnose as no overt lameness, just reduced performance, stiffness or resistance to movements, difficulties with pirouettes and flying changes
- Common Cause: Increased loading in collected trot, piaffe and passage movements when distal joints are in increased extension and hock joints are in increased flexion
- DX: nerve blocks, U/S, MRI
- TX: Rest & Rehabilitation, ESWT, PRP, Stem cells, Surgery
- Fair prognosis
  - Conformation & duration of injury are major factor affecting prognosis

Forelimb PSD

- Forelimb PSD most common in young horses
- Usually unilateral
- Common Cause: Extravagant movement with insufficient muscle strength and coordination to prevent hyperextension of carpus and metacarpal phalangeal joints
- DX: nerve blocks, U/S
- TX: R & R, ESWT, PRP, Stem cell
- Good prognosis
  - Chronic cases prone to reoccurrence

OA of Distal Hock Joints (Bone Spavin)

- Common lameness in all performance horses
- Most commonly bilateral in Distal Intertarsal (DIT) joints and Tarsometatarsal (TMT) joints
- C/S: Reduced expression at trot, difficulties in canter, collected gaits, difficulties with rhythm in piaffe and passage, toe dragging, shortened stride
- Common Cause: Circling and other specific movements, increased loading and compression of tarsal joints
- Often associated with back pain
- DX: nerve blocks, x-rays
- TX: IA injections, IRAP, other therapies
- Good to excellent prognosis

Risk Factors

- Murray et al. The Veterinary Journal. "Identification of risk factors for lameness in dressage horses". 2010 Apr;184(1):27-36.
- Murray et al. The Veterinary. "How do features of dressage arenas influence training surface properties that are potentially associated with lameness". 2010 Nov;186(2):172-179.

Risk factors

- Age: 33% increase risk in horses above 12 yrs old compared to under 7 years old
- Height : 15% increase risk in horses above 17.0 HH (170cm) than horses below 16.0 HH (163cm)
- Previous Careers: Previous racehorses has almost 2 times more likely to be lame
- Dressage level: Elite levels are 2 times more likely to be lame
- Concurrent health problems:
  - Horses with respiratory disease are more than 4 times more likely to be lame
  - Horses with a history of back pain are 3 times more likely to be lame

Exercise regimes

- Walk warmup – slight increase in lameness
  - May be inadequate way to warm up a horse
- Lunging – slight decrease in lameness
  - May be because horses that are lunged are fitter
  - May be a better way to warm up a horse than walking alone
  - May be the horse has improved coordination and adaptation of the musculoskeletal system
- Horses that are jumped, or turned out on pasture for prolonged periods are less likely to be lame
  - Improves flexibility, core muscle strength, fitness
  - May also be the horse has improved coordination and adaptation of the musculoskeletal system*
  - * Bones, tendons and ligaments strengthen and adapt to different surfaces and stressors over time

Arena surfaces

- Surfaces that were likely to become deeper when wet

(grass, woodchips) – increased likelihood of lameness

  - Woodchips most likely to cause slipping injuries, sand tripping injuries
- Waxed sand or sand with rubber less likely than

sand alone, sand with pvc, woodchips or grass

- Indoor arenas more likely to cause lameness
  - Smaller Size
- Maintained arenas less likely (privately owned arenas less likely)
- Sand arena more likely to cause lameness, but then become less likely the more days per week the horse is ridden in it
  - Due to muscle, tendon and ligament adaptation, cardiorespiratory fitness
  - Musculoskeletal systems become less prone to injury the more frequently the horses are worked on a surface, even if that surface is initially more prone to causing injury than others

Take Home Messages

- Changes in surfaces helps to strengthen bones, tendons and ligaments
- If a horse is only worked on one type of surface, they are more likely to become injured when they are worked on a different surface
- Gradual introduction to working on other surfaces may have beneficial effects in improved fitness and musculoskeletal adaptation
- Lunging and jumping help to strengthen core muscles protecting against injury
- Training needs to focus on strength and stamina just as much as skill
- Regular and long turnout in the field is protective against lameness
- Horses should be ridden in large, well maintained rings that are not prone to becoming deep or boggy when wet
- Early identification and treatment of respiratory disease and back pain are important

Regenerative Therapies

IRAP Therapy

- IRAP = Interleukin-1 Receptor Antagonist Protein
- Used for the treatment of Osteoarthritis (OA)
- Derived from the horse's own blood

- How it works:
  - Trauma to joint surface leads to production of inflammatory proteins including Interleukin-1
  - These proteins cause cartilage degeneration and potentiate further inflammation, inflammatory protein production and joint damage (degenerative cycle)
  - IRAP blocks the action of IL-1, reducing inflammation and cartilage damage

IRAP Production

- How it's made:
  - 50-60ml of blood is collected from horse
  - Blood is incubated for 21-24 hrs in a special syringe
  - Syringe is designed to stimulate the production of IRAP
  - After incubation the plasma (blood minus RBCs) is separated into several individual doses
  - Doses are frozen and stored
- Treatment Protocol:
  - IRAP doses are thawed and sterilely injected into affected joints
  - Protocol is typically once every 7-10 days for 3 treatments per joint
  - Additional doses can be saved for future use over a 2 year period

IRAP Benefits/Drawbacks

- Benefits (over traditional steroid/HA injections):
  - Will not trigger allergic reaction or 'flare'
  - Will not trigger steroid-induced laminitis
  - Appropriate for metabolically challenged horses
  - One collection can yield multiple treatments
- Drawbacks:
  - Same risk of joint infection
  - Most costly therapy overall, but not on a per-dose basis

PRP Therapy

- PRP = Platelet Rich Plasma
- Used for the treatment of injured tendons and ligaments
- Derived from the horse's blood
- How it works:
  - Platelets are cells found in blood that contain growth factors
  - Growth factors are integral to tissue regeneration and the healing process
  - These proteins enhance access of desirable inflammatory cells to the area of tissue injury
  - Improves healing of notoriously difficult to heal tissues of tendons and ligaments

PRP Production

- How it's made:
  - 50-60ml of blood is collected from horse
  - Blood is processed in a special centrifuge then
  - Platelets are concentrated into a smaller volume of plasma = PRP
- Treatment Protocol:
  - PRP is used immediately (not frozen and stored)
  - PRP is injected with ultrasound guidance into the core lesion of a tendon or ligament
  - Typically done under standing sedation and nerve block

PRP Considerations

- Not all PRP have the same concentration of platelets
- Platelets need to be activated to release their growth factors either before or during injection otherwise there will be no beneficial effects
- Platelets can trigger an inflammatory reaction or 'flare'
- Same risk of infection
- PRP needs to be administered immediately, no storage option
- Has to be collected and administered in-hospital, or same location as processing (ie not done on farm)

Pro-Stride

- Combination of IRAP and PRP
- Beneficial where inflammation is present AND tissue healing is required
- Derived from the horse's blood
- Blood is collected and processed ON-FARM within 20 min
- On-time use, no storage option
- Most expensive on a per-dose basis
- Appropriate for metabolically-challenged horses

Stem Cells

- Mesenchymal Stem Cells (MSC) are used in healing of joints, bone and tissue
- MSC integrate into the tissue themselves differentiating into specialized tissue types leading to regeneration of the tissue
- MSC also stimulate the healing process thru release of growth factors and anti-inflammatory proteins, recruitment of blood vessels and stimulation of local cells to regenerate

Stem Cells con't

- MSC are derived from bone marrow, fat cells, umbilical tissue and umbilical blood
- In horses, MSC are typically collected from the bone marrow in the sternum
- Marrow harvested under standing sedation and local block
- Stem cells are cultured in a lab
- Treatment typically involves 2 or 3 repeated injections, a month apart
- Not (easily) available in Canada
- Most expensive treatment

Noltrex & Arthramid

- Polyacrylamide hydrogel
- Designed for the treatment of OA
- Synthetic, inert, biocompatible, non-soluble IA therapy
- Designed to mimic the visco-elastic and lubricating properties of synovial fluid
- Longer-acting compared to traditional Steroid/HA joint injections

Osphos & Tildren

- Bisphosphonates labelled for use in Navicular Syndrome
- Inhibit bone resorption by inducing the cell death of osteoclast (bone-eating) cells
- Effect is the reduction of bone-related pain
- Has been used off-label for other types of bone pain
- Osphos is administered intra-muscularly
- Tildren is administered intra-venously
- Osphos shown to reduce lameness by one grade in 67% of horses within 1 month and 75% of horses within 2 months
- Both carry risks of colic and kidney damage

Legend

- Hyaluronic Acid (HA)
- Used for the treatment of Osteoarthritis (OA)
- Reduces the production and release of inflammatory proteins
- Stimulates the production of the joint's own HA
- Administered intra-venously (IV) or intra-articularly (IA)
- Clinical improvement in 90% of horses after IV and 96% after IA administration

Cartrophen Equine Forte

- Pentosan Polysulfate
- Prevention and Treatment of OA
- Improves cartilage health
- Stimulates the joints to produce HA
- Reduces production and release of inflammatory proteins

- Administered intra-muscularly (IM)
- Clinical improvement in 60% of cases
- Not currently available in Canada (but Cartrophen Vet – for dogs is available)