Non Surgical Management of Soft Tissue Injuries

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Non Surgical Management of Soft Tissue Injuries

- Biomechanical Principles
- Common front limb and hind limb injuries
- In hospital treatments
- At home treatments
- When to refer patient to physiotherapist
- Questions about specific cases
- Other treatment modalities WestVet physiotherapy department offers
Experience With Rehab?
Biomechanics

- How do structures function together?
  - Bone, joint, muscle, tendon, ligament, nerve
  - Think about origin, insertion and action
- Wolff’s Law
  - Tissues adapt to forces placed on them
  - “If you don’t use it, you lose it”
  - Balance between rest and early controlled weight bearing
Biomechanics

- Immobilization
  - Scar tissue/adhesions
  - Cartilage atrophy
  - Decreased synovial fluid production
  - Changes seen in 6 days

- Compensation
  - Loss of range of motion in one limb or joint leads to compensation in other structures
  - This causes increase stress on other structures
Tendon and Ligament Terminology

- **Tendinopathy**: Generic term that includes clinical and pathologic characteristics
- **Tendinitis**: implies *inflammation* is present
- **Tendinosis**: *degenerative* condition with lack of inflammation
  - Over-use injury, painful and decrease mechanical strength
- **Strain**: Stretching or tearing of muscles or tendons
- **Sprain**: Stretching or tearing of ligaments
Tendon and Ligament Biomechanics

- Poor blood supply
- Chronic use = pain but not always inflammation
- Tendons and Ligaments remodel in response to the demands placed on them
- Healing without loading leads to disorganized and weak structure
- Six weeks after surgical repair, tendons have 50% original strength
- One year after repair – 80% original strength
Muscle Biomechanics

- Muscle Contraction
  - Nerve signal causes a release of calcium resulting in a muscle contraction
- Denervation Injury
  - Leads to rapid atrophy of Type II fibers
    - Fast, high intensity fibers
- Immobilization
  - Leads to atrophy of Type I fibers
    - Prolonged, low intensity fibers
- Muscle Sprain
  - Both fibers can be injured
Thoracic Limb
Common Soft Tissue Injuries

- Shoulder
  - Glenohumeral ligament
  - Subscapularis muscle tears
  - Biceps brachii muscle tear/tendinopathy
  - Supraspinatus muscle tears and mineralization
  - Supraspinatus tendinopathy
  - Infraspinatus tears and bursa mineralization
Shoulder Anatomy
Shoulder Anatomy

- Supraspinatus
- Biceps brachii tendon
- Infraspinatus
- Teres minor

- Medial glenohumeral ligament
- Joint capsule
- Synovium
- Humerus
- Supraspinatus
- Biceps brachii tendon
- Transverse humeral ligament
- Biceps brachii muscle
Localize The Lesion

- Gait Analysis “Down on the Sound”
Localize The Lesion

- **Palpation**
  - Muscle symmetry
  - Painful when muscle or tendon is palpated

- **Range of Motion (ROM)**
  - Painful when shoulder joint is flexed vs extended
  - Biceps stretch test
    - Shoulder flexion, elbow extension

- **Medial Shoulder Instability**
  - Abduction angles
    - Normal: \( \leq 35 \) degrees
    - Abnormal: \( \geq 50 \) degrees

- **COMPARE TO THE NON LAME LIMB**
Medial Shoulder Instability

- Rotator Cuff Injury
- Glenohumeral ligaments are the primary stabilizers in the canine shoulder joint
- Subscapularis muscle attaches scapula to the body
- Causes: Repetitive stress injury, rarely traumatic, sudden abduction with valgus at the shoulder
Medial Shoulder Instability

- Fly Ball
- Weave poles
Medial Shoulder Instability

**Presentation:**
- Refusing tight turns
- Shortened stride
- Worse after exercise
- Poor response to rest and NSAIDs

**Diagnosis:**
- Thorough palpation of shoulder structures
- Atrophy of shoulder muscles
- Decreased shoulder ROM (extension)
- Discomfort on abduction
- Abduction angle >50
Medial Shoulder Instability

- Treatment
  - Mild/moderate/severe trauma
  - Expect 4-6 months of rehabilitation
  - Stop the repetitive stress
  - Hobbles:
    - Mild trauma 6-8 weeks
    - Moderate to severe trauma 2-4 months
Medial Shoulder Instability

- Prevent Secondary Complications
- Weeks 1-8
  - PROM of all joints bilateral
  - Pain control
    - Medications: Opioids, NSAIDs
    - Acupuncture, laser therapy, E stim
  - Isometric Exercise: Strength training in which the joint angle and muscle length do not change during contractions
    - Weight shifting and lifting opposite limb
    - Theraband exercises – target adductors
Medial Shoulder Instability

- Months 2-4 Active Range Of Motion
  - With hobbles still in place
  - Down to standing position
  - Walking over cavaletti poles
  - Under Water Treadmill
  - Stairs
  - Continue isometric exercises but increase intensity
    - Stand on wobble board or peanut
Medial Shoulder Instability

- Months 4-6
  - Recheck abduction angle
  - If improved then start exercises without hobbles

Important: Start with isometric exercises, then slowly work up to what patient was able to do with hobbles
Tendinopathy

- Biceps tendon, Supraspinatus tendon, Infraspinatus tendon
- Goals: Decrease pain and any acute swelling, improve range of motion, prevent secondary compensation, remember Wolff’s Law.
- Medium-large breed, adult, active dogs
- Becomes chronic, intermittent lameness, worse after exercise
Tendinopathy

- **Treatment: Surgical vs Non surgical**
  - **Surgery**
    - Biceps tendon: tenodesis, biceps release
    - Supraspinatus surgery: Removal of mineralized portion, Longitudinal incisions in tendon, Tenectomy
    - Usually favorable long term results
    - But can develop fibrous adhesions
  - **Rehab Therapy**
Tendinopathy

- Treatment Goals
- Pain and Inflammation Treatment Modalities
  - Ice, laser therapy, shockwave, therapeutic ultrasound, PRP, stem cells.
- Stimulate Tissue Healing
  - Laser therapy, isometric exercise, controlled weight bearing exercise
- Maintain Joint ROM and Flexibility
Tendinopathy

- Treatment Schedule
- Month 0-2
  - At Home 2x per day
    - 5 min of walking in house slow and controlled, every 2 weeks increase by 2 minutes
    - PROM 10-20
    - Weight shifting for 5 minutes
    - Ice for 10 min after exercise
Tendinopathy

- Treatment Schedule
- Month 0-2
  - In Clinic
    - Shockwave every 2-3 weeks for 2-3 treatments
    - PRP injection into the tendon and around the tendon, with shockwave
    - Laser therapy 2x per week for 4-8 weeks in between shockwave and PRP
    - E stim the muscle to encourage blood flow to the tendon
Tendinopathy

- Treatment Schedule
- Month 0-2
  - In Clinic Physiotherapy
    - Start slow – isometric exercises
      - Picking up opposite limb, Joint compression, Standing on uneven surface
    - Cross friction massage
      - Moderate pressure perpendicular across desired tissue
      - Break adhesions and realign fibers
    - Passive Stretching and Joint ROM
Isometric Exercise
Tendinopathy

- Treatment Schedule
- Month 2-4
  - Pain and inflammation should be resolved
  - Start active range of motion
  - Neuro muscular re education
  - Work on confidence
Tendinopathy

Treatment Schedule

Months 2-4

- Under water treadmill – low intensity AROM
- Swimming for 5 minutes
- Walk over cavaletti poles – 2 inches off ground
- Walk up 5 stairs
- Down position to standing, repeat 5 times
- Increase walks at home
- Continue isometric exercises and stretching
Tendinopathy

- Treatment Schedule
- Months 4-6
  - Over next 2 months slowly increase exercise intensity and reps.
  - Expect 6 months of rehab
  - At 6 months can start training again, but have to start small
Carpal Hyperextension Injury

- Biomechanics of the carpus
  - Flexors under tensile stress at rest, while standing
  - No muscles insert on the carpus, so stability is dependent upon the ligamentous structures
Carpal Hyperextension Injury

- Large/sporting dogs
- Usually associated with a fall
- Tear in palmar fibrocartilage and short ligaments
- Avulsion/chip fractures common

Diagnosis
- Palpation and radiographs
- Visualize carpal hyper extension
Carpal Hyperextension Injury

- **Treatment**
  - **Mild** – Support carpus and rehabilitation
  - **Severe** – Surgical arthrodesis
Carpal Hyperextension Injury

- Rehab Therapy
  - In brace only for 2-3 months
  - Laser therapy 2-3x per week for 2-3 months
  - Continue passive range of motion while in brace
  - E stim of muscles to prevent atrophy
  - Isometric exercises
Carpal Hyperextension Injury

- Rehab Therapy 3-4 months
- Add in active range of motion at the clinic and at home with brace on
  - Under water treadmill
  - Walking over cavaletti poles
  - Wobble discs and wobble boards
  - Down to stand exercises
Carpal Hyperextension Injury

- Rehab Therapy 4-6 months
  - Start doing exercise at the clinic without brace
  - Slowly increase how much time without the brace
  - At 6 months goal is to be without brace at rest and use brace during intense exercise
Pelvic Limb
Common Soft Tissue Injuries

- Muscles at risk of injury
  - Cross multiple joints
  - Myotendinous junction (origin and insertion)
  - “Groin muscles”--hip flexors, adductors, hamstrings
  - Iliopsoas Strain

- Partial achilles tendon rupture
- Patella Luxation
- Cruciate Ligament Disease
Muscle Injuries

- **Diagnosis**
  - Palpate muscles
  - Put muscle in stress position
    - Iliopsoas strain - hip extension, internal rotation
  - Ultrasound, CT and MRI
Muscle Injuries

Treatment
- Rest for 3-5 days
  - Pain medication, NSAIDs, acupuncture, laser therapy
- Controlled re mobilization for 4-8 weeks
  - 0-2 weeks PROM
  - 2-4 weeks AROM
  - 4-8 weeks increase exercises over time
- Minimize scar tissue
  - Laser therapy, therapeutic ultrasound, massage
Muscle Injuries

- Anatomy!!!
  - Know origin, insertion and action
  - Do action passively to stretch the muscle

- Semimembranosis/semitendinosis trauma
  - Origin: Ischiatic Tuberosity
  - Insertion: Tibia
  - Action: Extend the hip
  - To Stretch Muscle: Flex the hip
Partial Achilles Tendon Rupture

- Made up of:
  - gastrocnemius
  - biceps femoris,
  - semitendinosis, gracilllis
  - and superficial digital flexor tendon

- Action: Tarsal extension, stifle flexion
Partial Achilles Tendon Rupture

- Injury can occur without trauma
- Most common in Labradors, Dobermans
- Gait: Stifle extended, hock flexed, and digits flexed
Partial Achilles Tendon Rupture

- **Treatment**
  - Complete tears require surgery
  - Conservative management for partial tears
Partial Achilles Tendon Rupture

- Rehab Therapy
  - In brace for 3-4 months
  - Laser therapy 2-3x per week for 3-4 months
  - Continue passive range of motion while in brace
  - E stim of muscles to prevent atrophy
  - Isometric exercises
Partial Achilles Tendon Rupture

- At 4 months should be able to stand on limb with out hyperflexion of tarsus
- 4-5 months AROM with brace
  - Hydrotherapy, cavaletti poles, stairs
- 5-6 months start isolation exercises with out brace and goal is at 6 months can add in AROM with out brace.
- But have pet always wear brace when active
Patella Luxation

- Medial more common than lateral
- Grades I-IV; can progress from I-III
  - I: IN-IN;
    - II: IN-OUT; tibial rotation <30°
    - III: OUT-IN; tibial rotation 30-60°
    - IV: OUT-OUT; tibial rotation 60-90°
- May be associated with limb deformity
- 25-50% bilateral
- Considered heritable—DO NOT BREED
Patella Luxation

- Gait evaluation
  - Intermittent hopping, skipping, reluctance to jump
  - If non weight bearing
  - Check for CCL tear
  - Grade luxation
Patella Luxation

- Treatment
  - Depends on grade
  - Early I, II – Rehab
  - III, IV – Surgical
Patella Luxation

- **Goals:**
  - Decrease pain and inflammation
    - Ice, Pain medication, NSAIDs, laser therapy, E stim, shockwave
  - Improve strength
    - Isometric exercises, hydrotherapy, cavaletti poles, stairs/ramps
  - Increase intensity over time
    - Wobbles boards, jets during hydrotherapy, land treadmills, jumps
Cruciate Ligament Disease

- What do we know
  - Most common cause of hind limb lameness and OA in dogs
  - Multifactorial disease complex
  - ~50% bilateral
  - <20% due to trauma
  - Individualized approach to treatment
Cruciate Ligament Disease

- Developmental/ genetic
- Immune-mediated
- Metabolic—fat metabolism, nutrient deficiency
- Hormonal—early spay/neuter, thyroid hormone, PTH
- Primary CCL cell abnormalities
- Joint incongruity, compensation, activity, trauma
- Genetics/ breed conformation
Cruciate Ligament Disease

- Physical Exam
  - Gait evaluation - usually WB lameness, positive sit test
  - Standing evaluation - hip, stifle flexion, hock extension. Joint effusion
  - Palpation – Pain in extension +/- meniscal click
Cruciate Ligament Disease

- Treatment – Surgery is gold standard
- But sometimes surgery is not an option
  - Control pain and inflammation
    - Ice, pain medication, NSAIDs, laser therapy, E stim
  - Stabilize joint with brace
  - Try light exercise with brace
Questions
Other Services

- Advanced lameness evaluations
- Post surgical rehabilitation
  - Improve pain and swelling faster, decrease compensation related complications, improve range of motion, decrease scar tissue, return to activity sooner
- Non surgical management of neurologic disorders
- Weight loss programs
- Pain management
  - Arthritis, neoplasia, trauma/wounds
- Sports medicine
Thank You