CYCLING INJURIES

Bike Fit + Rehab = Happy Cyclist

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Objectives

1. Epidemiology
2. Biomechanics
3. Overuse injuries
4. Prevention

Cycling Epidemiology

- 100 million Americans ride bicycles
  - 5 million cyclists ride 20 days per month
- Cycling injuries result in 500,000 Physician visits per year
- Estimated cost of 8 billion dollars

Epidemiology

- Overuse injuries most common, traumatic event second
  - Improper training
  - Improper bike fit
- Cycling is a repetitive activity
  - 1 hour = 5400 pedal revolutions
  - Can result in microtrauma or overuse injuries
  - Knee most common location or overuse injury

Injury Incidence

- Wilber et al used questionnaire
  - Neck 48.8%
  - Knee 41.7% (26-65%)
  - Groin/buttock 36.1%
  - Hands 31.1%
  - Back 30.3%

Injury Predictors

- Low weekly mileage - ≤ 26 miles/wk
- Duration in low gears
- Years of cycling experience
- Average speed ≤ 14 mph
Cycling Biomechanics

- Sagittal plane sport and a partially closed kinetic chain activity
- Joints go through restricted ranges of motion due to fixed buttock and foot positions
- Power is transferred from rider to bike via pedal-cleat system
- 2 Phases of the pedal cycle
  - Power
  - Recovery

Power Phase

- Starts just prior to top dead center (TDC) and finishes at bottom dead center (BDC)
- Propels bicycle forward
- Greatest muscular activity in this phase

Power Phase Forces

- Forces applied to pedal
  - Seated, half of body weight
  - Standing, 3x body weight
- Greatest F applied at middle half of power phase, F is perpendicular to pedal

Recovery Phase

- Starts just before BDC and finishes at TDC
- Realigns foot and leg for next power phase
- Negative recovery phase pedal F (wt of limb applies torque to crank)
Common Cycling Injuries

Knee Pain
1. Anterior
   • Patellofemoral pain x 2
   • Patellar tendonitis
2. Lateral
   • Iliotibial band syndrome
3. Posterior
   • Hamstring

Anterior Knee Pain

Patellofemoral Pain
“Retropatellar knee pain”

- Excessive compressive load between knee cap and femur
- Causes
  1. Muscular imbalances
  2. Improper pedaling
  3. Seat too low
  4. Seat too far forward
  5. Gravel too high
  6. Excessive hill riding
  7. Improper training

Treatment
Retro PFP

- Flexibility
  • Quad
  • Hip flexor
  • Hamstring
- Strength
  • Weight bearing co-contraction
  • Gluteals, hamstring, quadricep
- Education on pedaling mechanics
Patellofemoral Pain

“Medial knee pain”

- Excessive shear forces between knee cap and femur

- Causes
  1. Muscular imbalances
  2. Increase Q angle
  3. Foot/LE malalignment
  4. Seat too high
  5. Pedal width too wide
  6. Improper training

Treatment

Patellar PFP

- Strength
  - Non weight bearing to weight bearing
  - Gluteal, core, hamstrings
  - Knee control

- Foot mechanics
  - Orthotic to shoe or cleat

- Education on pedaling mechanics

Patellar Tendonitis

- Adverse line of pull on tendon

- Causes
  1. Muscular imbalances
  2. LE alignment
  3. Seat too low
  4. Seat too far forward
  5. Improper training

Treatment

Patellar tendonitis

- Strength
  - Non weight bearing to weight bearing
  - Gluteal, core, hamstrings
  - Knee control

- Foot mechanics
  - Orthotic to shoe or cleat
Lateral Knee Pain

- Excessive friction of distal IT band over knee (medial femoral condyle)
- Friction can be caused for many reasons
  - Muscular imbalances
  - LE leg length
  - Leg alignment
  - Foot placement on pedal
  - Seat too far back
  - Seat too high
  - Training error

Treatment

- IT band mobility
  - No stretch, foam roller massage
- Strength
  - Gluteals
  - Core
- Orthotics for leg length and alignment
- Pedaling mechanics – knee position

Iliotibial Band Syndrome

- Excessive friction of distal IT band over knee (medial femoral condyle)
- Friction can be caused for many reasons
  - Muscular imbalances
  - LE leg length
  - Leg alignment
  - Foot placement on pedal
  - Seat too far back
  - Seat too high
  - Training error

Treatment

- IT band mobility
  - No stretch, foam roller massage
- Strength
  - Gluteals
  - Core
- Orthotics for leg length and alignment
- Pedaling mechanics – knee position

Posterior Knee Pain

- Excessive load on tendon in lengthened or stretched position

Hamstring Strain

- Excessive load on tendon in lengthened or stretched position
- Friction can be caused for many reasons
  - Muscular imbalances
  - LE leg length
  - Leg alignment
  - Foot placement on pedal
  - Seat too far back
Treatment
Hamstring strain

- Strength
  - Eccentric hamstring strength – work hamstring in lengthened position
  - Improve glut strength and pedal mechanics
  - Core
- Flexibility
  - Hip flexors or pelvic position
  - Correct leg length, usually short side

Hip pain
“soft tissue impingement”

- Excessive compressile load to soft tissue in front of hip
- Causes
  1. Decreased glut and hamstring strength
  2. Poor hip or back mobility
  3. Aggressive tri position
  4. Poor riding technique

Treatment
Hip pain

- Hip joint and back mobilizations
  - Self mobs
  - Gluteal strengthening
  - Pedaling mechanics
Low Back Pain

- Causes
  1. Tight musculature
  2. Poor core strength
  3. Leg length discrepancy
  4. Seat too high
  5. Handle bar too low
  6. Seat too far back
  7. Unilateral riding

Treatment

- Low back pain

  - Flexibility
    - Hamstrings, hip flexors

  - Core strengthening
    - Gluts, abdominals, back extensors

Core Strengthening

- Plank positions
- Physioball exercises

Neck Pain

- Causes
  1. Excessive neck extension
  2. Poor thoracic spine mobility
  3. Seat too far back
  4. Handle bars too low

Treatment

- Thoracic spine mobility
- Strength
  - Shoulder blades
  - Neck – chin tucks

Prevention

- Good bike fit
- Appropriate training progression
- Multi-planar strength
- Mobility
Summary

• BIKE FIT!!!!

• Symmetrical bicycle, asymmetrical cyclist
  - Fix asymmetries through rehab or prevention
  - Rehabilitation and Direct Access Physical Therapy – 263-4765

Summary

• Repetitive stress
  - Training progression with solid base
  - Move in multiple planes to prevent breakdown

• Fixed foot and fixed buttock
  - Higher stress to knee

Thank You

References

• When the Foot Hits the Ground Notes.