Cycling Medicine

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Introduction

• Cycling vs. Running
• Overuse injuries
• Cycling medical issues
• Training
Happy riding/competing

- Listen to your body
- Increase gradually
- Train hard
- Be smart (conservative)
- Have fun
What do you call an injured runner?
Cycling versus Running

- Non-impact
  - No stress fractures
- Eccentric muscle action not important
  - Rare to get muscle tears or ‘pulls’
- Hours and hours may be spent bicycling
  - Less overuse problems than running
- Overtraining or staleness is more common
Contact Overuse

Saddle Sore

Hot Foot, Morton’s neuroma

Neuropathy
Hot Foot/Metatarsalgia

- Numb Toes
- Pain under the ball of the foot
- Sensation that someone is searing the bottom of your foot with a blowtorch
- See riders shaking foot out of pedals
- Nerves squeezed under the metatarsal heads

Andy Pruitt’s Complete Medical Guide
Hot Foot

- Tight shoes
- Structural feet problems
- Small pedals
- Feet swell during long ride
Hot Foot Treatment

- Move cleats 2mm back (and lower your saddle the same amount)
- Check inside shoe for cleat bolts
- Thinner cycling socks
- Arch supports, metatarsal pads
- Pedals with larger platforms
Morton’s Neuroma

- Impingement of interdigital nerve between 3\textsuperscript{rd} and 4\textsuperscript{th} metatarsal
- Chronic inflammatory mass
- Between 3\textsuperscript{rd} and 4\textsuperscript{th} metatarsal classically
Morton’s Neuroma Treatment

- Cortisone
- Massage
- NSAID
- Shoe inserts
- Surgery
Saddle Sores

- Moisture + Pressure + Friction
- Chafing
- Ulceration
- Folliculitis
- Abcess
- Subcutaneous nodules
Saddle Sores: On The Bike

TREATMENT

- Change saddle
- Cut a hole in the saddle
- Check saddle height and tilt
- Clean chamois, no seams, keep dry
- Gradually increase saddle time
- Don’t sit around in your kit after riding
- Emollients
Saddle Sores
Medical Treatment

• Prevention
  – Keep dry, clean, chamois, avoid shaving high

• Medical Treatment
  – Warm soaks
  – Topical cortisone, anti-fungal, anti-bacterial
  – Oral antibiotics
  – Surgical incision and drainage
  – Surgery
Hand Neuropathy

- Cyclist’s Palsy (Ulnar Neuropathy)
- Carpal Tunnel Syndrome
- Worse after long rides
- Worse on rough terrain
- EMG reversible changes
- May become permanent
Hand Neuropathy
On The Bike Treatment

• Relieve pressure
• Pad bars
• New gloves (not gel)
• Reposition often
• Bars too far forward
• Too low
• Too much tilt
Hand Neuropathy Medical Treatment

- Massage
- Cortisone
- NSAIDs
- Night splint
- Strengthen upper extremity
- Surgery
Bursitis

Greater Troch

Pre-patella and MCL bursa

Ischial Tuberosity
Ischial Tuberosity Bursitis

• ‘Sits Bones’ sore
• Cold weather, early season, time trialing
• Rest, Massage, Cortisone
• On the Bike:
  – Change saddle
  – Check saddle height and tilt
  – New chamois
Greater Trochanteric Bursitis

• Proximal ITB Syndrome
• Pain with lying on side at night
• Physical therapy
• Massage, Cortisone
• On the bike:
  – Check saddle height
  – Check cycling form

The Anatomy of ITB Syndrome

- Tensor fascia latae
- Gluteus maximus
- Iliotibial band (ITB)
- Site of inflammation over lateral epicondyle

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Pre-Patellar Bursitis

- Aspiration and fluid analysis
- Cortisone
- RICE and massage
- On the bike:
  - Check cleat and position
  - Check saddle height and fore-aft
  - Check pedal technique
  - Check crank arm length

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MCL Bursitis

- Pain and tenderness over MCL
- MRI if suspicious for meniscal tear
- Massage
- Cortisone
- On the bike:
  - Check cleat
  - Check saddle height and fore-aft
  - Check pedal technique
Most Common

ITB

Patella Femoral
Patella Femoral Pain Syndrome

• Pain under the patella from excessive load
  – Hill climb
  – Wind
  – Big gear
  – Time trialing
  – Weight training
  – Too much too soon
Patella Femoral Pain Syndrome

- Tender patella facets
- Tender patella compression
- Unable to do one legged squat
- No effusion
- Pain with sitting too long
- Downstairs painful
Patella Femoral Pain Syndrome Treatment

• Off the Bike
  – Massage
  – Cortisone or viscosupplementation
  – Physical Therapy

• On the Bike
  – Check if saddle is too low or forward
  – Check if cranks are too long
  – Relative rest, supple spinning
ITB Syndrome Distal

- Anterolateral pain
- Burning, or snapping
- Most common tendon injury
- Climbing pushing big gears
- Wind
- Stationary Trainer
ITB

- Core strength
- Massage
- Assisted Stretching
- Physical Therapy
- Leg length evaluation
- Address training and bike fit
## Knee Pain and Adjustment

<table>
<thead>
<tr>
<th>Location</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior</td>
<td>Saddle too low</td>
<td>Raise saddle</td>
</tr>
<tr>
<td></td>
<td>Saddle too far forward</td>
<td>Move saddle back</td>
</tr>
<tr>
<td></td>
<td>Cranks too long</td>
<td>Shorten cranks</td>
</tr>
<tr>
<td>Posterior</td>
<td>Saddle too high</td>
<td>Lower saddle</td>
</tr>
<tr>
<td></td>
<td>Saddle too far back</td>
<td>Move forward</td>
</tr>
<tr>
<td>Medial</td>
<td>Toes point out</td>
<td>Point in</td>
</tr>
<tr>
<td></td>
<td>Feet too far apart</td>
<td>Move closer</td>
</tr>
<tr>
<td></td>
<td>Tight pedal tension</td>
<td>Lower tension</td>
</tr>
<tr>
<td>Lateral</td>
<td>Toes point in</td>
<td>Point out</td>
</tr>
<tr>
<td></td>
<td>Feet too close</td>
<td>Move apart</td>
</tr>
</tbody>
</table>

Arnie Baker 1998 Bicycle Medicine
Strain

Cervical

Lumbar
Cervical Strain/Shermer Neck

- Neck tightness/muscle spasm
- Can’t turn your neck to the side
- Bars too low or too far forward
- Need to exclude discogenic or other worse pathologic cause
Shermer Neck Treatment

• Prevention- gradual increase riding and time in aero bars
• Raise stem and seat
• PT: Manual Therapy, Strengthening Program
• Trigger point injections
• Pain medication
Lumbar Strain

- 2nd most common complaint of cyclists
- Improper bike fit and too rapid change in activity
- Core weakness
- Often etiology of pain not clear
- PT, NSAIDs, rest, bike adjustment
Just in Cyclists

- External Iliac Artery Endofibrosis (EIAE)
- Bone density
- Pudendal nerve issues
- *Clavicle fractures
There are injuries in medicine that are unique only to athletes. And there are unique injuries that are known only to sports medicine physicians.

Iliac Artery Disease in Cyclists is one such injury.
EIAE

- Iliac Artery Kinking (Goof Schep)
- Endofibrosis (Chevalier)
- Prevalence of 20% in top cyclists
- Sensation of dead leg, powerlessness, pain
- Disappear upon ‘rest’
- Multiple doctors with multiple tests
Pathogenesis

• Sheer stresses of high blood flow
• Mechanical stresses of body position
• Anatomical factors
  – Tethering collateral branches to the psoas muscle
  – Excessive lengthening and kinking
  – Psoas muscle hypertrophy compression
  – Ilioinginal ligament impingement
• Hereditary and metabolic factors
Tethering of the EIA to the Psoas by a side branch
Kinking of the EIA
Tests

- Ankle Brachial Index
- Echo-doppler
- Arteriogram
- CT angiography
- MRI angiography
Provocative Cycling Test ABI

- 20 watt per minute ramp protocol
- ABI measured immediately post exercise
- Supine and 90 degree hip and knee flexion
- Positive Test:
  - ABI < .54
  - Ankle Difference > 23
  - Ankle Pressure < 107
- History + Exam + Exercise Test Classified 86%
Angiography
Treatment

• Change bike position to one of less flexion
• Surgical release of artery (mobilization)
• Vascular reconstruction
• Stop riding
• Natural history and long term follow-up?
Their Stories

Ryan Cox, Barloworld Rider, April 9, 1979 – August 1, 2007
Section of bone showing osteoporosis

Normal Bone  Osteoporotic Bone

Reproduced from J Bone Miner Res 12(6):115-21 with permission of the American Society for Bone and Mineral Research
Bone Health in Cyclists

• Weight bearing exercises increases bone density

• Cyclists have low BMD compared with non-cyclists athletes and sedentary control

• Cyclists lose BMD during the season

• Mechanism not clear

Barry, BMD decreases over the course of a year in competitive male cyclists. JBMR 2008,23,484
Pudendal Neuralgia

- Occurs in male cyclists
- Numbness and tingling in scrotum and penile shaft, temporary impotency
- Treat by mechanical changes
  - saddle horizontal or special saddle
  - no aero bars
  - padded shorts
  - don’t hug the seat on hills
  - ride in stirrups over bumps
Clavicle Fracture

- Fall with arm at its side
- Used to be treated non-operatively
- Higher rate of non-union than previously thought
- Risk of non-union: increasing age, female, comminuted, fracture displacement
- Current treatment is operative in many cases

TRAINING
Training Periods of Pros

- **Nov - Dec**:
  - Rest: 90%
  - Pre-Season: 10%
  - Competition: 0%

- **Dec - Feb**:
  - Rest: 0%
  - Pre-Season: 80%
  - Competition: 15%

- **Mar - Oct**:
  - Rest: 10%
  - Pre-Season: 75%
  - Competition: 10%

% in Zone 3:
- > 90% HRmax

% in Zone 2:
- 70 – 90% HRmax

% in Zone 1:
- < 70% HRmax

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Training Stimulus

Performance vs. Training Volume/Intensity
Overtraining

• Cyclists are notorious
• Clinical history is most important
• Many blood tests, not very helpful
• Exclude organic disease
• Profile of Mood States
• Morning HR
• Performance Testing Decrement
  – VO2, Lactate, HR, Watts, RPE relationship
Differential Diagnosis of Overtraining

- Overtraining (Under-recovering: life, sleep, stress, nutrition)
- Depression (mental health)
- Viral illness
- Anemia
- Mono (age appropriate)
- Hypothyroidism
- Other
Laws of Training

1. The race is won in the off season
2. Train frequently, all year round
3. Start gradually and gently
4. Build a big base
5. Go **hard** on the hard days, **easy** on the easy days
6. Do not overtrain
7. Avoid monotony
8. Train with others
9. Keep a logbook
10. Take a break at the end of a season, stay active

Adapted from Tim Noakes in the Lore of Running
Thank You