Unpacking Lower Extremity Cycling Disorders

Curtis Cramblett PT, CFMT, CSCS, Coach

- Physical Therapist 20 years, physio educator
- PT and fitter for Garmin ’09-’11, multiple Olympians and triathletes
- Fit Certified: RETUL, FIST, SICI, Bike PT
- Chair Med of Cycling Bike fit Task force, Board IBFI
- Cyclist / Racer 25 years
- Cycling and Strength / Conditioning Coach
Disclosures

• Consultant for
  – Garmin Vector Pedal
  – Retul
  – Run Scribe
MOVING FROM ISOLATION TO INTEGRATION

FROM PRACTITIONER TO A WELLNESS TEAM

FROM KNEE TO BODY
Bent Up

• Why might an elite athlete getting lots of care still feel this is neutral?

• Sit on the bike twisted?

• And only be able to use his left leg ‘when the stars are aligned’?
PART 1

If we are to understand what is keeping our cyclist Legs from feeling and performing better...

We must explore the interconnectedness of the bodies systems.
Understand the Myo-FASCIAL chain in a closed kinetic system
Trauma experienced thru a SYSTEM:
Anatomy of a Chain
Tensegrity: Tensional Integrity

Buckminster Fuller
Tensegrity

Buckminster Fuller US Patent '62
Tensegrity
Regional Interdependence

“A musculoskeletal examination model whose time has come” Josh Cleland, PT’95
Feel it yourself

- Standing feel the foot drop
Be an Inspector to find underlying diagnosis

Or be the plumber
“The greater the ignorance the greater the dogmatism.”

Sir William Osler, MD
STEP 2: FIND IT

Making wise clinical decisions
Wise Diagnoses / Treatments

Evidence Based Practice*

Best Objective Data / Research

Wise Clinical Decision

Clinical Experience

Client Values - Goals

* 2005, ASHA's Coordinating Committee on EBP
Clinical Scientists

Subjective Objective

Id Relevant Data

Develop Hypothesis

Intervention

**GOAL**: Eliminate Lateral Knee Pain currently feeling knee on trainer

Knee angle 20 deg, PF 120 deg
Positive Ober Test
Current knee discomfort

IT Band aggravated by Seat ht

Change Bike, Treat, Exercise

Recheck
“The practice of medicine is an art based on science”

Sir William Osler, MD
Be the Detective FIND Diagnostic Clues

Interview

• Aggravating / Easing Factors
• Changes since onset of symptoms
• Trauma / Surgeries
Be the Detective FIND the *Relevant* Signs

Objective Evaluation

- Observation
- ROM
- Palpation
- NRM Control / Strength
- Special Tests
Are you sure about your Diagnosis hypothesis?

- You rely on more than one variable
- Clustering – Rule of 3’s (3)

Pattern Recognition

“When you hear hoof beats think horses ….. not zebras”*

Zebra Medicine

Theodore Woodard, MD 1940
Explore 3 Dx of LE

1) FAI (Femoral Acetabular Impingement)

2) Met Head Pain / Metatarsalgia

3) PFPS (Patella Femoral Pain Syndrome)
Visual Animation FAI
Hip – FAI

Excess Bone at Head-Neck Junction

Labrum & Excess Bone

MIXED

PINCER

CAM

NORMAL
Diagnosis FAI

Ortho Exam

• Subj: Anterior hip pain with flexion activities (5)
• Somara “C” Sign
• Hip Outcome Score

Clohisy MD, ‘89
Diagnosis FAI

- Ortho Exam
  - Obj: Scour (4) / FABER(20), Flex Add IR
  - Strength: Weakness around the hip w/ decreased EMG TFL

- Diff Dx
  - Labral Tears, Hip OA, Tendinopathies of Psoas

- R/O: Femoral Stress Fractures
Special Tests
Special Tests

MR Arthrography

MR Arthrogram
FAI Conservative Care

Nonoperative treatment for femoroacetabular impingement: a systematic review of the literature

• Review of 48 articles published: 2013 PM R. Wall PD, et. al

• SYNTHESIS (65% of articles indicated a trial of conservative care was appropriate)

• CONCLUSION: Although the available literature with experimental data is limited, there is a suggestion that physical therapy and activity modification confer some benefit to patients.
Integrated Treatment

MD

PT

Fit

Other

Coach
Integrated Treatment

- Fit: Open hip - handle bars, crank arm length, seat position

- PT: Balanced hip / pelvic mobility, strength, gluteals, stability core
Integrated Treatment

• Coach:
  – Pedaling style: too much pull up
  – Time in drops
  – Modification of intensity / duration

• MD: NSAIDs, Injections, Surgical Intervention
From the hip to the foot

A Regional Interdependence Model
Metatarsalgia

• Collection of Dx

• Diff Dx:
  – Arterial stressFx, bursitis, fat pad, …
Diagnosis

• Ortho Exam
  – Palpation (Mulders click) Heel Raises immediately vs after multiples fx vs, msk eval

• Special Tests
  – Ultra sound, Diagnostic injections
Integrated Treatment

MD

PT

Fit

Other

Coach
Integrated Treatment

Bike fit:
It’s Been Done!
Integrated Treatment

• Fit: Shoes
Integrated Treatment

- Fit: Shoes
  - Width
  - Length
  - Volume

Shoe test inser
Integrated Treatment

- Fit:
  - foot bed / Orthotics
  - size of pedal / cleat
  - cleat placement
Integrated Treatment

• PT:
  – Foot and Calf mobility,
  – foot intrinsic NRM / Strength

• Coach:
  – training load
  – cadence, pedaling mechanics
Integrated Treatment

- MD: NSAIDSs, injections, immobilization / unweighting
- Surgical: depends on pain generator
Sometimes you have zebras
Knee
Patella Femoral Pain Syndrome

Perpetrator
Stiff Hip
Weak Foot
Diagnosis

• Ortho Exam: crepitis, pain w/ resisted knee ext, step down?

• Special Tests: Xray –
  – Merchant XRAY PIC pat positioning* abnormal pat positioning
  – MR for Chondromalacia

• Diff dx
  – Pat tendonitis, intra articular (sub chondral bone), itb (bursa) plica, retinaculum
Integrated Treatment

• Fit
  – Seat ht (13)
  – Crank Arms
  – fore – aft (14)
  – seat choice

American A. of Pediatrics
Integrated Treatment

- PT\(^{(15)}\)
  - Mobility esp Patellar, NRM esp Quad and hip - > Str, strong NRM connected hip and foot*

Symposium on PFPS -> proximal disorders to distal pain
Treatment

- MD:
  - NSAIDS, injections
  - Surgical: lateral release
Knee Pain Case

Dx:
- PFPS
- Patellar Tendonitis


*Isolated knee pain: a case report highlighting regional interdependence.*
Relevant Signs and Symptoms

Client Goals

Symptoms
Speed (power / aero)
Other

Relevant S/S
Currently Measurable
Observable
Questionable

Jeff Maitland, PT, FAAOMPT
Relevant Signs: Pedaling Mechanics
Relevant Signs / Symptoms

Relevant S/S

- Pedaling Mechanics
- Lunge Mechanics
- Power / Pressure
Integrated Treatment Approach

• Physical Therapy
Foot Nrm and Strength

- Controlled Position
Able to push thru pedal?
Foot Nrm and Strength

- Foot intrinsics, Tibialis Post / Peroneus longus
  - Clinic: hands on facilitation (PNF) for initiation, cold
  - Home: Therapeutic Exercises including **neutral** heel raises, taught him how to tape
Effects of the foot intervention

Relevant S/S

- Pedaling Mechanics
- Lunge Mechanics
- Power / Pressure
Left Hip Mobility Loss

Hip flexion: 120 left // 143 deg right

- Clinic:
  - Joint Mobilization, soft tissue mobilization at hip

- Home:
  - Foam Roller and Ball in Gluteal area
  - Active stretching – hip flexion with self joint mobs.
Integrated Treatment Approach

Coach

– Cadence / Gears (Force)

– Training load (hours) / intensity (power)

– Pedaling Style / Pressure on the pedals
Integrated Treatment Approach

• Accommodated Bicycle Fit

• DPM / PT
  – External Support: Orthotics, Shoes, Tape

• MD: Referral as needed
In Summary

- MD
- PT
- Fit
- Other
- Coach

Think Regional Interdependence
Integrated Approach

- Why might an elite athlete getting lots of care still feel this is neutral?
- Sit on the bike twisted?
- And only be able to use his left leg ‘when the stars are aligned’?
CHANGE

Doing the SAME thing and expecting DIFFERENT Results

If you Always DO

What you have Always DONE

Then you will Always GET

What you have Always GOT
Unpacking Lower Extremity Cycling Disorders

MOVING FROM ISOLATION TO INTEGRATION
FROM PRACTITIONER TO TEAM
1. *Sir William Osler’s Aphorisms From His Bedside Teachings and Writings Collected by Robert Bennett Bean, M.D.*, [3]


4. Evidence-Based Practice: Opportunities and Challenges for Continuing Education Providers by Robert Mullen

5. Clinical Presentation of Patients with Symptomatic Anterior Hip Impingement. John C. Clohisy MD ’09


9. Clohissy et al, (‘09) Clinical presentation of patients with symptomatic anterior hip impingement, Clinical Ortho and Related Research


12. Metatarsalgia. Differential diagnosis and therapeutic algorithm. Fuhrmann RA¹, Roth A, Venbrocks RA.


19. Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Orthopaedic Section of the American Physical Therapy Association, 2014

20. Notzli ‘02 J Bone Joint Sx: HIP:"Thirty-three athletes (41%) had abnormal hip exams: Hip Pain and FABER distance asymmetry of greater than 4cm" Using standardised MRI, the symptomatic hips of patients