“Healthy Runner: How Pylometrics and LE Kinesiology Play a Crucial Role in the Treatment of Runners’ Injuries” - Alisa Drapeaux, DPT, ATC, LAT

“Case Study - Functional Manual Therapy™ Management for a Patient with Abdominal Pain” - Matt Bravard, PT, CFMT

“Safe Patient Handling” - Nikki Nigg, Director of Inpatient Rehab, Mercy Medical Center

“The Meaning of Home” - Pam Dehne, PT

“L-Spine 101” - Jason Putz, PT

“Training to Run” - Jason Meyer, PT

“What I Wish I Would Have Known” - Jason Putz, PT
Rehabilitation of the Healthy Runner: Biomechanics role in injury
Alisa Drapeaux DPT, ATC, LAT

Background
- Clinic Director for Physiotherapy Associates for 8 years
- Outpatient orthopedics for 10 years
- Clinical Specialty: Ankle/Foot, Runners Injuries
- University of Iowa DPT and ATC- Cross Country/Track
- Active Runner, Husband and 2 Children

Objectives
- Review Running Gait Cycle
- Discuss LE kinesiology relation to Common soft tissue injuries
- Discuss common upper body kinesiology relation to LE Injuries
- Analyze current research in Prevention of runners injuries
- Outline the role of pylometrics in rehabilitation for runners
Lower Extremity Biomechanics

- Center of gravity determines forces on LE joints
- Moment arms directly proportional to joint pressures
- Implication: SL Stance in running - MA on PFJ vs. Lumbar Spine

Running Biomechanics

Difference between walk cycle vs. running cycle
Running Cycle

- 40% running = Stance Phase = Injury
- Stance Phase
  - Heel Strike
  - Tibial Internal Rotation
  - Subtalar pronation
  - Knee flexion to extension
  - Talocrural plantarflexion for push off
- No Double Stance Phase

Running Cycle

- The Running Cycle = Pylometrics
- Running has three phases:
  - Stance phrase
  - Swing phrase
  - Float phrase
- No double stance time
- A run speed of 6 min/mile = a single running cycle will take approx. 0.7 sec and SLS is only 0.22 sec

THE CHANGES THAT CAN HAPPEN IN 0.22 SECONDS = CHRONIC INJURY

http://www.sportsinjurybulletin.com/archive/biomechanics-running.html

Biomechanics of Running

Video of running Heel Strike and Toe off

CLP0023.AVI
Biomechanical Abnormalities

Hip to Foot Mechanics

A Break in the Kinetic Chain

Foot/Ankle
- Medial heel whip
- Lateral heel whip
- Excessive pronation
- Midfoot strike vs heel strike vs forefoot

Break in the Kinetic Chain

Lower Extremity
- Genu Valgum
- Genu recurvatum
- Impaired hip extension
- Excessive knee flexion
Break in the Kinetic Chain

- Pelvis
  - Trendelenburg
  - Anterior pelvic tilt
  - Posterior pelvic tilt

Break in the Kinetic Chain

- Lombothoracic
  - Hyperlordosis
  - Excessive Thoracic Rotation
  - Arm swing
  - Elbow carrying angle
  - Kyphosis or forward lean

Runners Injuries

- Low Back Pain
- Shin Splints
- Plantar Fascitis
- Knee Pain
- Hip Pain

- 79% of runners injured per year
Common Overuse Injuries

- 50% of recreational runners will obtain an injury during their training (McMillian et al).
- Common Injuries:
  - Plantar Fascitis
  - Proximal hip strain
  - Achilles Tendonitis
  - Patellofemoral Pain Syndrome
  - Posterior Tibial Tendon Dysfunction (PTTD)

Fix the Problem

- “The structure complaining is typically NOT the problem, but instead it is the structure that is COMPENSATING for the problem”
  - Forefoot hypermobility = problem
  - Compensating structure = thoracic spine rotation
  - Symptoms: Midback pain

Lumbar Mechanics
Lumbar Mechanics

- Complain of LBP after or during a run?
- Neutral Spine with hip extension
  OR
- Hyperlordosis with excessive hip ext

Clinical Relevance: Lumbar Facet Syndrome

Lumbar Faulty Mechanics

- Anterior Pelvic Tilt
  - Weak Gluteals, Hamstring m.
  - Poor endurance of posterior m.
  - Restricted hip flexor length

Clinical Relevance
  - Forces hip IR = knee stress, hip pain
  - Hyperlordosis = LBP

Lumbar Faulty Mechanics

- Lateral trunk lean
  - Weak hip abductors
  - Compensatory pattern for Distal weakness
  - Poor lumbar mobility secondary to posture

CLINICAL RELEVANCE
  - Low back pain
  - Distal IF tendinitis
  - WB pattern = tendon loading
Hip Biomechanics

Hip Faulty Mechanics

- Pelvic Drop
  - Weak Hip Abductors
  - Shortened lower extremity

- Clinical Relevance
  - Iliotibial band syndrome
  - Knee Pain
  - Lumbar facet syndrome

Hip: Is the foot the real cause?

- Initial Evaluation: Runner with Iliotibial Band Syndrome
- Prescribed Treatment: NSAIDs, activity modification, and stretching.

- Functional Biomechanical Approach:
  - Gait analysis reveals lack of calcaneal eversion and rigid supinated foot
  - Therefore, lack of tibia and femur IR resulting in gluteus medius inhibition

Geraci et al. 2005
Knee Biomechanics

- Decreased ankle mobility
- Increases demands on subtalar joint, weak hip ER, shoe selection
- Tight quadriceps, increased patellofemoral stress
- Hyperextension of the knee
- Genu valgum or varum (Bow-legged or knocked knee)
- Decreased knee flexion with heel strike

Knee Faulty Mechanics

- Biomechanical factor: Increased hip adduction, greater rearfoot inversion
- Problem: Hip abductor weakness
- Symptomatic structure: Knee pain, lateral hip pain
- Prevalence: Females > Males
  - Q ANGLE
  - Wider pelvis
  - Muscle imbalances

Patellofemoral Syndrome

- Biomechanical factor: Increased hip adduction, greater rearfoot inversion
- Problem: Hip abductor weakness
- Symptomatic structure: Knee pain, lateral hip pain
- Prevalence: Females > Males
  - Q ANGLE
  - Wider pelvis
  - Muscle imbalances

Patellofemoral Syndrome

- Patients with PFPS and:
  - Forefoot valgus > 2 degrees
  - Passive hallux extension > 78 degrees
  - Navicular Drop > 3 mm

Respond best to OTC orthotics to achieve > 50% pain reduction (Sutlive et al)

Quadriceps Angle vs Navicular Drop

- Neuromuscular response to WB perturbation
  - Increased navicular drop and low quadriceps angle
  - Slower reflex times in lateral HS during femur ER perturbations
  - ACL injury in females

Faulty Foot Mechanics
Foot/Ankle Faulty Mechanics

- Medial heel whip or lateral forefoot whip

Faulty Foot Mechanics

- Medial Heel whip
  - Prolonged pronator
  - Attempt to resupinate foot
  - Subtalar varus

  - Clinical Relevance
    - Medial knee pain
    - Plantar Fascitis
    - Shin splints

- Toe out, premature heel lift, knee hyperextension

- Short step length, Poor pronation control and knee extension

- Drop foot or reduced clearance during swing

- Restricted Gastroc/Soleus length = Leading to ACL stress and metatarsal pain

- Weak Gastroc/Soleus = leading to Plantar Fascitis or Medial Tibial stress syndrome

- Weak Tibialis Anterior = leading to hip pain
Gait Analysis - Mid stance and Foot strike abnormalities

The Foot Changes LE Biomechanics

- Foot type
  - Pes Cavus foot = LE stress fractures
  - Pes Planus foot = Medial Tibial Stress Syndrome (McMillan et al)
  - Pes Planus foot = Metatarsal Stress Fractures (Queen et al)

Effect on Tibial Translation

Did you Know?

- Females have greater tibial translation in static posture
- Effect of foot pronation > genu recuvatum & torsion in intact ACL subjects

(Trimble et al)
Faulty Foot Mechanics

- Gait: Increased tightness in hamstrings = tight tibia rotators = increased subtalar pronation velocity
- "Floppy foot" contributing to shin pain, posterior tib tendonitis, and plantar fascitis

Treating Cause vs. Symptom

- Etiology of Overuse Injuries:
  - Anatomical Structural deformities
  - Training Errors
  - Interactions between shoes and running surface
  - 58% of runners with LE overuse injuries = pronated in neutral stance

  (James et al)

- Cause - PRONATION
  - Positive relationships between navicular drop and MTSS injury
  - Sex and navicular drop had 76% prediction accuracy for MTSS

  (Bennett et al)

Muscle Activation & Orthotics

- Vastus Lateralis and Gluteus Medius activation with orthotics during:
  - 1. Lateral Step Down
  - 2. Single leg Squat

- Clinical:
  - Patellofemoral Syndrome

Hertel et al 2005 Single Leg Squat

- Vastus Lateralis and Gluteus Medius Activation
- Neutral Knee alignment
- Orthotics prevention
- Clinical
Putting the pieces together

- Functional Biomechanical Approach can treat the cause of a microtraumatic injury
- Biomechanics can dictate the ligamentous and osseous stress on the LE
- Prevention of further sports related repetitive injuries are dictated by evaluating the kinetic chain

Evidenced Based Clinical Treatment

Novice Runners = Injuries

- Do novice runners have weak hips and bad running form?
  - Decreased trunk side-plank endurance was associated with an increased peak hip internal rotation angle
  - Isometric strength was not related to kinematics = MMT relevance
  - Prevention programs should focus on trunk performance and NM control, not hip strength

Schmitz A. et al Gait Posture. 2014 Mar 4
Relationship between hip strength and trunk motion in college cross-country runners.

- Isokinetic hip extension and abduction torque

  Significant inverse correlations to thoracic rotation during stance phase

- Conclusions: Decreased hip extension and abduction strength led to increase in pelvic obliquity and thoracic rotation

The relationship between field tests of anaerobic power and 10-km run performance.

- Indicate that anaerobic power is significantly related to distance running performance
- Beneficial for runners to supplement aerobic training with plyometrics and sprinting.


Rehabilitation for Runners
Rehab: Initiate Running or Plyometrics 1st?
- SL stance phase in running = plyometrics
- Initiation of DL and SL pylometrics prior to walk/jog protocol
- Pain and Biomechanical assessment with plyometrics in clinic 1st
- 7x body weight with SL stance

Functional Testing: Return to Running
- DL plyometrics onto even and uneven surfaces
- Progression to SL pylometrics with review of LE biomechanics, pain
- 10 SL hop test

Barefoot Running
- 79% of runners today get injured/year
- Barefoot running encourages
  - Forefoot striking pattern
  - Reduction impact loading
  - Reduction in stride length
  - Increased sensory feedback from ground
  - Increased energy storage in the arch

REDUCTION OF INJURY??

reductionsa.edu/med/med/medicinabarefootrunnerreducesinjury2012sep10v11n5p244-50
Conclusion

- Evidenced based data supports the link of biomechanics or LE kinesiology to LE injuries in runners
- Evaluation of patients should always include the entire LE kinetic chain
- Utilizing plyometrics during rehabilitation with runners

Thank you for participating in the IPTA PT Pearls Questions?
Functional Manual Therapy™ (FMT) management for a patient with abdominal pain

Matt Bravard, PT, CFMT

Objectives:

1. Discuss the role of FMT
2. Describe FMT interventions indicated in patients with abdominal pain
What is FMT?

Functional Manual Therapy™ is an integrated and seamless treatment system which couples *mechanical* treatment of the joints, soft tissues, visceral and neurovascular systems with *manual neuromuscular facilitation* to enhance optimum *motor control* and human function.

The Institute of Physical Art (IPA)

Founding Directors:
- Gregory S. Johnson, PT, FAAOMPT, Co-Founder FMT
- Vicky Saliba Johnson, PT, FAAOMPT, Co-Founder FMT

Founded in 1978 to promote the use of manual therapy and education to facilitate optimum human function and performance.

The IPA basic treatment philosophy and premise

- All patients present with mechanical, neuromuscular, and motor control components.
CW’s story

Medical history

Objective findings

Course of treatment
Safe Patient Handling
Presented by Nikki Nigg, MPT
Director of Inpatient Rehab
Mercy Medical Center–Des Moines

Objectives
- Define the case for Safe Patient Handling and Movement (SPHM)
- Describe the opportunities for PT’s to play key roles in SPHM programs
- Identify and describe appropriate devices for use in a variety of rehab tasks

Why Safe Patient Handling?
- Healthcare industry is facing a huge challenge
- Nationally the total lost work days due to injury is the highest among healthcare workers
- Each year more than 67,000 back injuries occur among healthcare workers.
- OSHA regulations limit lifting to 35# per person; our patients weigh more than that!
Why caregivers are at High Risk for Injury

- The sheer volume of lifting, turning, pulling and positioning of patients leads to fatigue, muscle strain, and injury
- Patient handling tasks are unpredictable.
- Patients are asymmetric, bulky, and cannot always be held close to the body.
- The amount of assistance a patient can offer varies at any given point in time
- Most patient care is completed on a flat plane, using the weaker muscles of the arms.

Therapy Culture

- How therapists see themselves:
  - Hard working and caring
  - Value knowledge and skill
  - Committed to their patients
  - Strong sense of duty
  - Unlikely to be injured

Therapy Culture (cont.)

- How therapists see themselves when injured:
  - Proud, didn’t expect an injury
  - Injury should have been prevented with proper techniques
  - Pressured to return

Effects of workplace injuries on Therapists

- Continue to work
- Self treat/self manage
- Under report injuries
- Change work setting and work habits
- Accept injuries as part of the job


Perceptions after workplace injury

- Affected personal lives
- Affected professional identity
- Decreased job satisfaction
- Presenteeism: At work and productive


APTA Vision Statement 2013

- Transforming society by optimizing movement to improve the human experience
- APTA Position Statement on Safe Patient Handling and Mobility (issued August 2012) states PT/PTA’s are experts and are in a unique position to evaluate and appropriately use new technology. Should be leaders in SPHM.
Legislation/Regulations

- States with some type of SPHM legislation include: New York, Texas, Ohio, Rhode Island, Washington, Hawaii, Maryland, Minnesota, New Jersey, Illinois, California, Missouri
- Federal legislation includes Nurse and Health Care Worker Protection Act of 2009
- National Interdisciplinary SPHM Standards developed by ANA and a working group of medical professionals (2013)

VA SPHM Program

- Over $200 million allocated over 3 years to implement nationally in all VA Medical Centers
- System-wide evidence-based initiative for SPHM (2007)
- Includes all patient care settings (inpatient, outpatient, ancillary, long term care)
- Program elements include: equipment, ergonomic assessments, training, clinical tools, policies, incident review
- Research is ongoing
- Their tools are available for public use on their website

Evidence Based Practice

- Medical complications increase with prolonged bed-rest for hospitalized patients
  [JAMA, 2008;300:1685-1690]
- Low levels of physical fitness are directly associated with all-cause mortality and cardiovascular disease
  [JAMA, 1989;262(17):2395-2401]
- Most hospitalized patients currently spend most of their time in bed.
  [J Am Geriatr Soc. 2009; S7(9):1660-5]
PT's Role in SPHM Programs

- Manage SPHM programs
- Advocates/role models of behavior
- Experts in body mechanics and mobility
- Experts on equipment, participate in selection of new equipment
- Teaching and coaching colleagues
- Collaborate with vendors
- Collect data, research, share experiences
- Participate in safety and ergonomic committees

Benefits of SPHM in Rehab

- Improves therapist safety, extending careers
- Favorable patient outcomes
- Supports culture of safety
- Improves patient-centered care
- Promotes early mobility

Assessing SPHM with patient

- Can the patient assist? Do they cooperate?
- Is friction an issue?
- Is the patient safe with transfers/bed mobility?
- How many times can patient complete task?
- Can we lift/hold the patient safely?
- How many staff are required for this task?
- Are their complicating conditions affecting patient's ability to transfer/reposition?
Sample SPHM Assessment

- Enhance treatment times
- Enhance weight bearing
- Facilitation
- Improves patient confidence
- Improved time and resource management
- Reduction of max A x 2-3 transfers
- Patient’s effort is limiting factor

Equipment as a Tool

Equipment–Glide sheets
Equipment—Mechanical lift (ceiling)

Equipment—mobility aide

Equipment—Lateral transfer aides
Equipment - Other

- Gait belts
- Walkers
- Canes
- Leg lifter

Specific tasks

- Bed mobility
- Bed/chair transfers (sit to stand)
- Toilet transfers
- Gait training
- Stair training

Summary

- Use of technology/equipment allows us to free up our hands and let the technology do the lifting, and our hands do the facilitating.
- Overall goal with discharge planning is to maximize mobility in transition to the next level of care.
- PT staff is qualified to take the lead on SPHM for their facilities.
Any questions?
Home has special meaning for older adults; it holds much emotional significance and is a meaningful expression of personal and social self. An older person’s home represents a reservoir of family history and memorabilia.

Staying in one’s own home preserves self-esteem and perpetuates a sense of tradition. To be forced to leave this loving, familiar, and secure environment means losing memories, independence, and control. Elders, however, may have to leave their homes because of their own failing health or their spouses’ poor health or death.

Sometimes we patients, spouses, family members, or health professionals are challenged to make serious life changing housing recommendations based primarily upon physical or functional abilities without realizing the full impact moving may have on the older adult’s sense of well-being. We all need to be advocates for the elderly by recognizing how housing is one of the most important factors in the quality of life for the older adult. We need to educate ourselves and look inside the skin of the older adult and gain understanding of what is important for that older adult to surround himself with.

Questions we should ask ourselves:
- Can we get the older adult’s physical body safer in his own home by working on strengthening, balance, range of motion, coordination, endurance, or walking skills? Physical & Occupational Therapists can be utilized to evaluate and treat the older adult with as geriatric specialists.
- Can we begin using devices such as walkers, canes, toilet risers, commodes at night, or bath benches?
- Can we modify how we perform our routine activities of daily living to be safer?
- Have we looked carefully at how we can change or modify the home to make it safer? Many Home Health agencies offer in home safety assessments to evaluate personal safety strategies.
- How much support from either family or friends as caregivers is available?
- Have we utilized all the local resources through agencies such as Heartland Senior Services or similar programs that may be available to help? These may include adult day care, senior programs, or transportation or meals on wheels. Home health services could possibly include skilled nursing, physical therapy, occupational therapy, speech therapy, medical social services, health care aides, homemakers, or companions.

Additional questions we should ask if even after all the above changes are not working and it may be time to look at moving to a different level of care or to a facility include:
- When does working to stay in your own home involve too many chronic stressors for the older person or his or her caregivers to handle?
- When does moving to a safer or easier environment where there is assistance result in a loss of purpose because there are too few challenges?
- Do we know if that process of change will maximize the fit between the elder’s own needs and the offering of that environment?
- Are those changes good or bad?
- Are those changes going to create or eliminate stress?
- Does that stress encourage growth or decline?

Remaining in one’s own home versus moving to a different level of care requires one to:
- Identify where older people prefer to make their home and where they want to be in later life.
- Integrate physical, psychosocial, cognitive, functional, economical, financial, or environmental elements, which may act as negative or positive stress factors.
- Recognize the important role of caregivers and social networking.
- Develop a plan to assist the older adult and family with making the decision to move or stay.
- Construct guidelines for implementing changes.
- Research what type of housing is available in the community. We are so very fortunate in Iowa to have various levels of care available to age in place with wonderful facilities and professional staff.
- DEFINITELY INCLUDE THE OLDER ADULT IN THE DECISION-MAKING!!!!!!!!!!!!!!
Credit to those that I have learned from:

No one flavor of Kool Aid

- Robin McKenzie, CNZM, OBE, FCSP(Hon), NZCP(HLM), Dip. MT, Dip. MDT
- Brian Mulligan, FNZSP(Hon), Dip. MT
- Stanley Paris, FAPTA, FNZSP(Hon), NZMTA(Hon), FIFOMT(Hon), FAAOMPT, MCSP, BIM
- Duane Saunders, MS PT
- Shirley Sahrmann, PT, PhD, FAPTA
- Gary Gray, PT

Local PT talent that has guided me:

- Louie Greenwald, PT
- Melvin Harvey, PT
- Doug Crosby, PT
- Pam Hazell, PT
- Bob Rhea, PT
Lumbar Evaluation

History Taking
- Very important!
- They usually tell you how to treat them (if you take your time and listen)
  - Mechanism of injury? How did they do it?
  - What activities make it feel better?
  - What activities make it feel worse?
  - WB vs. NWB

Flexion vs. Extension
Static vs. Dynamic
L-spine, SI, Pelvic, or Hip
Lumbar Evaluation

- Posture
- Gait
- Palpation
- ROM
- Strength
- Special Tests

Posture

- Observe standing, sitting, and non-WB
- Is there a lateral shift?
- Is pelvis rotated anterior or posterior?
- Flat back! Lordosis! Where!
  Low or high in the lumbar spine!
- Skinfolds/ceases- Bilateral!
Gait

- Observe from front, back, and side
- Toe walk, heel walk, wide, tandem, & cross-over
- Antalgic gait?
- Leg length discrepancy?
- Drop foot or lack of push-off at terminal stance?

Palpation

- Must understand the power of touch
- Palpable spasms
- Dermatomal patterns
- I cannot feel if left sided L2 facet is stuck on L3
- I can tell you that left side bending & extension ROM will cause the area around left L2-3 to be sore

IS PALPATION RELIABLE.??

ROM-McKenzie
- ROM needs to be done in WB and non-WB to give you a true appreciation of what is going on mechanically
- Repetition of the same ROM is sometimes needed to provoke a response
- FIS, RFIS, EIS, REIS, etc…
- Side glides vs. side bending

Strength
- Myotomal Patterns
- Bilateral or unilateral?
- Generalized or specific?

Special Tests
- SLR test
  Disc pathology/hamstrings
- Thomas or modified Thomas test
  Disc pathology/hip flexors
- Reflexes
- Slump test
Assessments - McKenzie

- Algorithm
  *Physical Therapy April 2011*
- Postural Syndrome
- Derangement Syndrome
- Dysfunction Syndrome

Comprehensive Algorithm

Postural Syndrome

- Patients with this syndrome are usually under 30 years of age, have sedentary occupations, and frequently lack exercise
- Develops pain which appears locally, usually adjacent to the mid-line of the spinal column
  - The pain is provoked by mechanical deformation of soft tissues which occurs only when spinal segments are subjected to PROLONGED static loading with joints at end-range.
  - This occurs most commonly when poor sitting or standing postures are adopted.
  - They frequently complain of pain felt either separately or simultaneously in the cervical, thoracic, and lumbar regions.
- Pain from postural origin is NEVER induced by MOVEMENT, is NEVER referred, and is NEVER constant
- There is no pathology, no loss of movement, and there are no signs in this syndrome. There is nothing to see.
- Movements are normal, and patients with this syndrome are sometimes described as being hypermobile
- The only objective information appears on examination of posture AT THE TIME OF ONSET OF PAIN when the patient will be seen to adopt poor postures and will be seen to hang at the end-range of movement.
- Pain from the postural syndrome could arise from any of the soft tissues adjacent to the vertebral segments
  - It is probably ligamentous in origin.

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**Derangement Syndrome**

- Patients with the derangement syndrome are usually aged between 20-55 years
- They invariably have poor sitting posture
- They develop pain usually of sudden onset
  - That is, in a matter of a few hours or over a day or two, they change from completely normal to significantly disabled beings.
- Very often this syndrome appears for no apparent reason. The symptoms may be felt locally, adjacent to the mid-line of the spinal column, and be referred distally in the form of pain, paresthesia, or numbness.
- The symptoms are produced, abolished, increased or reduced and made better or worse

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- Pain from the derangement syndrome may alter and change both in regard to the area affected which may alter, or the extent of the area affected which may increase or decrease.
- Pain from the derangement syndrome may cross the mid-line.
  - For example, move from right of the low back to the left.
- Discogenic pathology may always be suspected when the patient describes that his pain changes position and radiates when he performs different movements.
  - When the referred pain changes its shape and or position, displacement within the intervertebral disc is changing its shape and or position and this occurs with movement or sustained positioning.
Pain from derangement syndrome is frequently constant in nature. There may be no position in which the patient can find relief. The pain therefore may be present whether movement is performed or not and this pain is usually described as an ache.

That ache is then made worse by movement in certain directions and is made worse by movements in certain directions and reduced by movements in other directions.

In the derangement syndrome, especially in severe cases, gross loss of movement may occur. Also in severe cases, deformities such as kyphosis and scoliosis are frequently seen. Sudden loss of spinal mobility and the sudden appearance of deformity in acute low back and neck pain may be likened to the sudden locking that may occur in the knee joint where internal derangement of the meniscus is common.

The mechanism of internal derangement of the intervertebral disc is not fully understood. That tissue originating from the innermost aspect of the intervertebral disc can be displaced towards, and escape through the anular wall is inarguable.

It is likely that there exists an embryonic stage of displacement, when migration of tissue is in its infancy, when small displacements are able to be replaced, when displacement is in fact reversible.

In patients under the age of fifty, internal derangement of the spinal segments may result from excessive displacement of the fluid/anulus complex.

In patients over fifty, derangement may result from displacement of the degenerated anulus and/or the now fibrosed nucleus.

Displacement of the fluid nucleus/anulus complex will disturb the normal resting position of adjacent vertebrae and if excessive, will force deformity.

Displacement will also affect the ability of the joint surfaces to move in their normal pathways and deviation to the left or right of the sagital plan will result.
Dysfunction Syndrome

- Patients with this syndrome are usually over 30 years of age except where trauma can be identified as the original cause of their problem.
- They commonly exhibit poor posture and are frequently under exercised.
- They insidiously develop pain which appears locally, adjacent to the mid-line of the spinal column. The pain is provoked on attempting FULL movement, by mechanically deforming shortened soft tissues in segments that have reduced elasticity and movement. The pain is ALWAYS felt at END RANGE and NEVER felt DURING the movement.
- With the exception of a patient with an adherent nerve root, pain from dysfunction is NEVER referred.

The loss of movement evident in the dysfunction syndrome arises from two common causes.

- The first, and most common, cause of reduced spinal mobility is poor postural habits maintained during the first few decades of life. This is especially so when the individual is under exercised. Poor postural habits allow adaptive shortening of certain structures. The result is a gradual reduction of mobility with aging. The movements reduced are usually those sagittal movements essential for the maintenance of the very erect posture.
- The second cause of reduced spinal mobility is contracture of fibrous collagenous scar tissue developed during repair following trauma. Thus, an inextensible scar can form within, or adjacent to, otherwise healthy surrounding elastic structures and will cause reduced mobility. The pain resulting from stretching this inextensible scar appears ONLY on attempting FULL END RANGE movement.

- The pain does not occur during the movement or before the structure is placed under tension. Surrounding healthy structures would be capable of further extensibility but are now restricted by the scar.
- It is not possible to identify the structure causing the pain of dysfunction, but any of the soft tissues adjacent to the vertebral column may adaptively shorten or may be damaged.
- Thus, the pain may result from adaptive shortening of the ligamentous structures in the segment, from the intervertebral disc, the apophyseal joints, the superficial or deep muscles or their attachments.
- The pain may also result from adherence of the root or dura following severe intervertebral disc bulging out but this is rather easily identified. Described simply, the pain of dysfunction is produced IMMEDIATELY by overstretching of the softened tissues.
Assessments

Concluding Differential Diagnosis

- L5 impingement with radiculopathy
- Piriformis Syndrome
- SI Dysfunction

- Recognize pathological tissue
- Make assumption of response treatment
Why you need to be clear with differential treatment diagnosis
Exercise prescription & manual therapy needs to be thought out

#1: Should respond to extension-bias exercise program
- May need to side glide & hip flexor stretching only

#2: Piriformis stretching is flexion activity
- If you apply both exercise activities, you negate extension-bias

#3: Without resolution of symptoms, further SI evaluation is needed
- SI usually does not refer below the knee

Treatments

Postural Syndromes
- Strengthening/stretching

Impingements/Derangements
- Centralization of LE symptoms first
  - SG, hip flexors, flexion, extension
  - NWB → WB
  - Direction of preference
  - Manual Techniques

Treatments, cont.

Dysfunctions
- Imbalances
- ROM / Stretching
- Manual Therapy
- SNAGS / MWM
- Prone, sitting, standing
- Progress Activity Stabilization
Lumbar Treatment

ROM
- We must address both hyper and hypomobile areas
  Sometimes we can have both going on in the lumbar spine
- We must address the status of the hip flexors (iliopsoas is very important) and the hamstrings

Lumbar Treatment

Manual Therapy
- Traditional P to A mobs
- Overpressure at end ROM
- SNAGS and MWM techniques
  Mulligan
- Self mobs (belt, overpressure, etc.)
- STM, DFM, ASTYM, Gaston, etc.
**Lumbar Treatment**

- Modalities
  - Traction
  - Saunders
  - E-stim/IFC
  - MIRE
  - Diathermy
  - HP/CP
Lumbar Treatment

Therapeutic Exercise – WE PRESCRIBE MOVEMENT AS OUR MEDICINE

- Black or White
  - Extension vs. Flexion
  - You must choose which direction to start in and follow that path
  - Always correct lateral shift first prior to flexion or extension movement
  - Understand your progression of HEP forces!!!

Lumbar Treatment

- Core Stabilization
  - Initially it has to be flex or ext bias, but as patient’s symptoms improve, we must incorporate the full circle.
Lumbar Treatment

- Education
  - Posture, mechanics, nature of tissue, healing time, etc.
  - Increases compliance with HEP
- Prevention
  - Every patient is entitled to the information that enables him or her to reduce their own pain/disability using their own resources

“No one flavor of Kool Aid is liked by everyone. Sometimes McKenzie works, but if it doesn’t, be prepared with another set of eyes!”

I hope I have given you some keys today.

Your patients are the locks.

Please open them!
Thank You!

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To address recurring running related injuries.
In response to “minimalist” running craze.
- Shoes with a toe to heel rise of less than 6mm.
- Increase in overuse injuries and impact injuries.
- Have changed shoes but mechanics remain the same.
To help runners improve performance.
- Efficiency of running mechanics, greater speed with same energy expenditure.
- Improved mechanics, less likely to get injured.

3 x 60 to 90 minute sessions. 1 session/week x 3 weeks.
4 – 6 runners/instructor.
Equipment:
- Track
- Video camera
- Small hand weights
- Pennies
- Pulling device
- Stop watch
Training to Run
Session 1

- Video taping.
- Cadence Count.
- Arm carrying angle (90 degrees or above)
  - “A” position. Equal distance of hand and elbows from trunk
  - Penny Drill. Run without dropping Pennies.
- Body lean and neutral spine.
  - Falling Forward Drill. Bend from ankles.
  - Forehead Drill. Light resistance to facilitate core.

“A” position

Falling Forward Drill
Review session 1 activities.
Learn Dynamic Warm Up (see attachment).

Trunk Rotation.
- Velcro Drill. Arms stay stuck to side of trunk
- Weighted Arm Swings Drill
  - Staggered feet, lunge position (Neutral)
  - Inline lunge position (Narrow)
- Single leg stance
Review session 2 activities.
Proper muscle recruitment.
- Wall Push Drill. Learn to react to ground. Push to ground.
- Tire Pull Drill. Learn to recruit correct running muscles.
- Cadence Count. Compare counts from session 1
Video taping.
Q & A.
Dynamic Warm Up

Research has clearly shown that passive stretching of "cold" muscles before exercise can lead to injury, rather than prevent it, as was originally thought. In fact passive stretching actually "switches" the muscle off! We also know that stretching effectively after exercise is a very worthwhile recovery and injury prevention technique. How then do we prepare our bodies in such a way that we can exercise in an effective and safe manner?

In order to ready the body for vigorous exercise we must bring it from its pre-exercise level of inactivity to a point of primed readiness to absorb training. This requires that the nervous system is "switched on", that the muscles are both centrally warm and elastic, that the joints and their surrounding ligaments are fully mobilized and that the fibers in the muscle groups necessary for the upcoming activity are fully recruited.

By using a series of activities that gradually transition the body from its state of rest to a state of full readiness, the athlete can ensure that the body is fully facilitated and wholly ready to perform an event or workout. These exercises were designed to gradually warm, activate, lengthen and prep the body safely and in such a way that the athlete is ready to absorb the value of training fully. The drills include activities that lengthen muscle groups, get muscle groups firing in correct sequence, raise core muscle temperatures to effective operating levels and mobilize joints effectively to promote relaxation and full, safe range of motion.

Safety Points

• Always complete some light walking or running before commencing with these drills
• Always start with the smallest range of motion possible and build up only to a level that is safe, comfortable and manageable
• Avoid exercises that cause anything but mild and safe discomfort
• Always stay within your capabilities—build your ability level from the inside out (don’t overreach)
• Wear appropriate footwear and clothing
• Preferably learn these drills under the guidance of a qualified instructor
• Minimize curve of the low back

Dynamic Warm Up Routine

1. Forward Arm Swings (Freestyle Swim). "Swim" forward by swinging the arms in large loose arcs. Make sure that you swing them with enough speed to create a little momentum. This is a mobilization exercise. Allow the hips to rotate freely & naturally. Keep walking forward while you do this.

2. Backward Arm Swings (Backstroke Swim). "Swim backstroke" by swinging the arms backwards in large loose arcs. Make sure that you swing them with enough speed to create a little momentum. This is a mobilization exercise. Allow the hips to rotate freely & naturally. Keep walking forward while you do this. Lead with the little finger & keep the palms pointing outwards over the top.

3. Forward Arm Swings (both arms together). Rotate both arms forwards with momentum. Keep low back straight & maintain a forward lean throughout. Keep elbows bent to protect shoulders. Also rotate the shoulders.

4. Backward Arm Swings (both arms together). Rotate both arms backwards with momentum. Keep low back straight. Lead with the little finger & keep the palms pointing outwards. Relax face & keep elbows bent. Do not force the arms backwards, allow the arms & shoulders to loosen naturally & move through their full range of motion, no matter how limited.
5. **Asymmetric Arm Swings.** Rotate one arm forward & the other backwards. Allow the hips to swivel in order to accommodate the shoulder rotation. Practice until comfortable with the coordination component.

6. **Heel Walk.** Walk forward keeping the forefoot off the ground. This is to activate the tibs/shins & stretch out the gastrocs/calves. Here you can do a little more than 7 steps per foot.

7. **High Toe Walk.** Use a normal walking gait. toe off strongly, pushing the body upwards & forwards. Keep the toe in contact with the ground - do not skip.

8. **Ankle Extensions.** A combination of heel and toe walking. Using normal gait walking, strike with the heel and roll through the entire foot pushing off using the great toe.

9. **High Knee Walk.** Use a normal walking gait. Strike with the heel; roll through the entire foot & then fire the leading knee to at least hip height. Simultaneously toe off strongly as with # 8, & keep the toe in contact with the ground. Keep leaning forward, especially when driving the knee upwards - do not skip.

10. **Knee Huggers.** Use normal walking gait. Lower leg action similar to ankle extension exercise. Opposite leg is pulled up to chest keeping a forward lean posture.

11. **Grapevines or Karaoke.** Moving sideways, keep arms outstretched. Have the trailing leg alternately go across the front then the back. It helps to turn the head with the trailing leg, i.e. when it goes across the front look in the direction of travel, when it goes past the back, look backwards. 1st walk this drill, with deep balanced steps, then run it with short rhythmic steps. Try to keep the upper body still while the hips rotate through 180°.

12. **Side Bends.** Interlock the hands, spread the legs about shoulder width & lift the arms above the head. Keep the low back relaxed. Do not lift the arms so high that the low back arches. Bend to each side while exhaling. Inhale when returning to the top. Keep the body upright, keeping the shoulders & hips square. Being bent a little forward is a good idea.

13. **Butt Kicks.** Walk forward with bent elbows & flick the heel up towards the glutes. Be sure to use only the hamstrings & not the gastrocs (calves) or low back - keep the pelvis in neutral. Then jog gently forward & flick the heel up on every 2nd step following the same principles. Finally do 8-12 alternating heel flicks while running easily. Again follow the same principles.

14. **Hip extension kicks.** Maintain forward lean (do not arch back), walk on midfoot and step through supported leg before raising foot. Accentuate push off phase.

15. **Hamstring Kick Outs.** Walk forward & with slightly bent knees, kick each leg out forward alternately. Bend the upper body towards the outstretched leg. Keep the support leg bent & make sure that the back foot stays up on the toe. Kick the leg out straight forward & reach the opposite hand out towards the extended shin or foot. Keep leaning & moving forward.

16. **Strides/Pick Ups.** After the Dynamic Warm Up Drills, walk & or run easily for 3 minutes & then do some strides. Start with the 1st one just a little faster than your warm up. Then gradually build pace with each consecutive stride. End with a pace just faster than your expected finishing or training pace. Complete 4 - 10 strides of 50 - 200m, or 15 - 45 seconds. Be sure to rest sufficiently between strides. Fewer strides executed correctly is the way to go.
Lower Extremity

Ankle
- Typical inversion sprain
- MWM of distal fib superior/posterior & taping
- MWM of sub-talar motion
- Con. Ed.
- “When the foot hits the ground everything changes”

Lower Extremity

Knee
- PFSS
  - Assessing knee function/presentation & the role the foot & hip play, especially for females
- MWM tibia IR & taping
- General LE flexibility improvements can help a lot of adolescents with knee pain
Hip

Greater Trochanter Bursitis

- TRUE?? or Glut med tendinopathy-needs strengthening
- Hip, L-spine pathology, or SI

Imbalances

- Tight hip flexors secondary to sitting jobs
- Glut med/hip ER strength greatly influences LE biomechanics & even LBP

SI / Pelvic Dysfunctions

- MWM for SI correction

SI/Pelvis

SI / Pelvic Dysfunctions

- MWM for SI correction

- SI stress tests- a more reliable way to identify SI pathology vs. L-spine source of pain
- Compression, gapping, & shearing
- Correct exercise prescription necessary!

Spine

Lumbar

- Correct exercise prescription is a must!
- McKenzie
- Previous presentation
- Previous abdominal, back, or pelvis surgeries
- Previous prostate surgery or radiation of prostate
Spine
Thoracic
– Mobilization of T-spine is a valuable adjunctive technique for c-spine and shoulder/scapular pathology
– Is it referred from the c-spine?

Spine
Cervical
▫ Mulligan
▫ Restoring ROM
▫ Decrease pain
▫ Truly clearing c-spine

Upper Extremity
Shoulder
▫ MWM of humeral head posterior/inferior
▫ MWM/Scapular assist-control of SAI
▫ GIRD
▫ Previous mastectomies or anterior rib/chest surgeries
▫ Breast radiation
Upper Extremity

Elbow
- Check shoulder first!
- MWM for epicondylitis

Wrist
- MWM

TOS

Realize UE symptoms that don’t make sense
- DOUBLE CRUSH
- Check scalenes and pecs
- Swelling
- Medial / lateral epicondylitis

General Principles

- Use eccentric strengthening for tendinopathies
- Integrated vs. isolated movements in strengthening & function
- Vestibular
- Many are not moving in the frontal or transverse planes
- Use it or start to lose it!!
Helpful Con. Ed. Courses

- McKenzie-MDT
- Mulligan Concepts
- Duane Saunders
- Stanley Paris
- Shirley Sahrmann
- Gary Gray
- ASTYM/Graston

Helpful Con. Ed. Courses

- Maitland
- FMS/SFMA - Gary Cook
- “When the foot hits the ground everything changes”
- Symposiums with good speakers to hear the interdisciplinary approach

Thank You!

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