SACROILIAC JOINT DYSFUNCTION AND PIRIFORMIS SYNDROME

Classic vs. Functional Movement Approach in Physical Therapy Setting

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Lumbar/Sacroiliac/Hip Anatomy

- Lumbar Spine
  - Intervertebral joints
  - Facet joints
- Sacroiliac joint
  - Anterior ligaments
  - Posterior ligaments
- Pelvis
  - Pubic symphysis
  - Obturator foramen
  - Greater sciatic foramen
    - Sacrospinous ligament
  - Lesser sciatic foramen
    - Sacrotuberous ligament
- Hip
  - Capsule
  - Labrum
Lumbar spine: flexion and extension
- ~30 total degrees of rotation L1-L5
- Facet joints aligned in vertical/sagittal plane

SI joints
- 2-5 mm in all directions, passive movement, not caused by muscle activation
- Shock absorption/accepting load with initial contact during walking

Hip Joints
- Extension 0-15 degrees
15% SI joint pain noted in chronic LBP patients

Innervation: L2-S3

Classic signs and symptoms

- Lower back pain generally not above L5 transverse process
- Pain can radiate down posterior thigh to posterior knee joint, glutes, sacrum, iliac crest sciatic distribution
- Pain with static standing, bending forward, donning shoes/socks, crossing leg, rising from chair, rolling in bed
- Relief with continuous change in position
J. Travell suspects Si joint pain may causes piriformis guarding and lead to Piriformis syndrome...
SI Joint Examination

- Tenderness to palpation of PSIS, lower erector spinae, quadratus lumborum and gluteal muscles
- Sometimes positive SLR
- Limited hip mobility on affected side
  - FABER test, knee to chest
- Multiple tests to assess hypomobile/affected side
  - Squish test, stork test, forward flexion test
  - Controversy on if manual therapists can detect at difference in 2-4mm of motion (50:50 interrater reliability)...future research project in our clinic???
    - All manual techniques create a change in ROM (www.clinicalathlete.com)
Piriformis Syndrome

- **Piriformis**: “pear shaped”, innervation S1S1
  - Origin: anterior sacrum (sometimes to margin of sciatic foramen and capsule of SIJ)
  - Insertion: superior medial greater trochanter
  - Other Lateral Rotators “GOGO’s” are distal to piriformis and lie anterior to sciatic nerve and attach to medial greater trochanter
  - Obturator internus: partly intrapelvic muscle and partly hip muscle (can contribute to pelvic floor dysfunction) exits through lesser sciatic foramen

- **Nerves from greater sciatic foramen**
  - Superior gluteal nerve and vessels, sciatic nerve, pudendal nerve and vessels, inferior gluteal nerve, posterior femoral cutaneous nerve, nerves to obturator internus, gemelli and quadratus femoris
  - Obturator externus branch of obturator nerve
  - Therefore pain referral can be in buttock, inquinal and posterior thigh as well as down lower limb.
Sciatic Nerve Variations

1: Tibial and Peroneal nerve pass anterior to piriformis (85%)
2: Peroneal portion passes through the piriformis and tibial anterior (10%)
3: Peroneal portion loops above, then posterior to piriformis and tibial anterior (2-3%)
4: Undivided sciatic penetrates piriformis (<1%)
Symptoms may be caused from trigger point referral of muscle, nerve entrapment/vascular compromise from compression of piriformis against the rim of the greater sciatic foramen and by SI joint dysfunction.

Symptoms- patient can’t sit still, worse with sitting, flexion abduction and MR or activity, sexual dysfunction.

Pain: lower back, groin, perineum, buttock, hip, posterior thigh, leg, foot and rectum during defecation.

Differential Diagnosis
- HNP
- Nerve entrapment (neoplasm, tumors, infection)
- Episacroiliac lipoma
- Facet syndrome with LBP and sciatica
- Spinal stenosis- bilateral
- Netter
- L4L5 HNP
  - L5 nerve root
  - Weakness in ant tib.
- L5S1 HNP
  - S1 nerve root
  - Weakness in gastroc
  - Diminished reflex
Janet Travell: Myofascial Pain and Dysfunction: The Trigger Point Manual

- Myofascial Trigger Point: “A hyperirritable spot, usually within a taught band of skeletal muscle or in the muscle’s fascia. The spot is painful on compression and can give rise to characteristic referred pain, tenderness, and autonomic phenomena.
- Specific pain referral pattern from muscle and fascia
“Lumbago Muscle”

Differential Diagnosis

- SIJ dysfunction
- Facet joint
- Sub gluteus medius bursitis
- Chronic pain following low back surgery
- Arachnoiditis
- Intermittent claudication
“Pseudo Sciatica”

Differential Diagnosis
- L4, L5, S1 Radiculopathy
- Trochanteric bursitis
- SI joint dysfunction
“Double Devil”
- Causes as much pain from nerve entrapment as it does from trigger points

Differential Diagnosis
- HNP
- SI joint dysfunction
- Post spine surgery pain
- Coccygodynia
- Nerve entrapments, neoplasms
Common PT Treatment

- Manual Therapy to balance or align pelvis, sacrum, and lumbar asymmetries
  - Muscle Energy, joint mobilization, trigger point release, myofascial release, strain counter strain, soft tissue mobilization, trigger point dry needling, etc.

- **Patient Education**: avoiding postures that irritate condition, sleeping techniques, body mechanics, encouraging patient movement to prevent fear-avoidance and progression to chronic pain syndromes

- Self Treatment techniques
  - Myofascial Release/Trigger Point Release
    - Foam Rollers, Mobility Sticks
    - Lacrosse Balls, Tennis Balls
  - Stretches
  - Lumbar/Core stabilization
PIRIFORMIS

SINGLE KNEE TO CHEST

- note opposite leg in extension to stabilize spine/pelvis
Common Treatment Approaches

- **McKenzie Exercises: all extension biased**
  - Philosophy: extension cycles of spine will push nucleus into the center of the disc
  - Works well for disc patients
  - probably not so good for facet joint pain or the patient who has very limited capsular mobility into hip extension
    - remember the body moves in the path of least resistance, they could become hypermobile in lumbar spine

- **William’s Flexion Exercises: all flexion biased**
  - Philosophy: opening up/distraction will take pressure of compressed nerves
  - Works well for spinal stenosis patients
  - Probably not so good for the disc. Stewart McGill, MD wrote an entire textbook on why our lumbar spines should never be loaded under flexion.
    - Philosophy: “We are one sit-up or crunch away from a disc herniation”
Moved Cadaveric and Virtual Spines through load and repetitive cycles to determine disc failure

- Predict risk of tissue damage:
  - Applied load > tissue strength = tissue failure (injury)

Pig spines:
- No failure with 260 N over 85,000 flexion cycles
- 867 Newtons over 22-28,000 cycles
- Sit-up/crunch = 3300 newtons
  - Close to compression level of NIOSH action limit
- Push-up = 1838N, 1-arm push up = 5848N!
Damage to annulus appears to be associated with fully flexing the spine
- Herniation over repetitive cycles of flexion
  - Caution with seated back extension machine, sit-ups, crunch, seated ab machine, single leg pistol squats !!!

Repeated twisting causes annulus to delaminate
- (McGill has not done research on

Spine health is about endurance not strength
These look cool but are they safe???
Flexed Spine under Load

Myoelectric silence in figure A = 1900 N of shear load!!! (think stretch weakness)

B: neutral spine posture: activates spinal stabilizers decreased shear to ~200N
Choose exercises that create least amount of compression but most amount of muscle activation

All in neutral spine curve
- Planks
- Side Planks
- Bird Dogs
- Bridges

Educate how to move better to spare the back
- Golfers lift
- Potty squat
- Build bridges
Look Familiar???
Lower Crossed Syndrome

- Tight Muscle Group
- Weak Muscle Group
- Tight Low Back w/ swayback
- Weak Abdominals
- Weak Gluteals
- Tight Hip Flexors
- Locked Knees
WELL I GUESS THAT SETTLES THAT OLD ARGUMENT.
I think that the ENTIRE spine should be able to move well into flexion and extension with good segmental mobility and motor control

- Screen AROM and just look at where curves and flat areas are
- Cervical Spine: a little of everything
- Thoracic Spine: primarily rotation
  - **Limited Thoracic rotation in all patients is very common probably because we live in flexion and our thoracic spines are rarely exposed to unilateral extension which is what creates rotation**
- Lumbar spine: primarily flexion and extension

Lack of hip joint extension and rotation mobility is very common
- FABER test

Hip external rotator and abductor (posterior lateral chain) weakness is very common
- Quick MMT

Most of my patients have left sided symptoms and right sided mobility restrictions
- Classic: Hypomobile right SI joint with compensatory irritation of left L5S1 facet joint, tight tender palpation of left piriformis
  - Hypotheses: right dominant world, driving with right foot??
Movement based approach to guide treatment

Screen full body movement first before looking at painful area
  - Determine where mobility and motor control issues are
  - Trying to get to the source of the dysfunction, not chase the pain
  - Treating movement patterns not specific muscles

Treatment Guidelines: 3 R’s
  - Calm down the painful area
  - Treat mobility dysfunctions first
  - Then address motor control: Reset, Reinforce, Reload
    - Neuromuscular re-education @ 20% MVIC, breathing should be natural with these exercises
Patient complains of chronic neck stiffness, lower back pain on the left side, worse with sitting, sometimes goes into buttocks, denies pain with coughing or sneezing. Mother of two, works from home in computer programming.

SFMA: dysfunctional non-painful multisegmental flexion (can’t touch her toes)
  - Breakout of flexion pattern:
    - left hip flexion selective motor control dysfunction (SMCD)
    - spinal flexion joint mobility dysfunction (JMD) and/or tissue extensibility dysfunction (TED)
Reset, Reinforce, Reload

- **Reset Left Hip Flexion**
  - Manual techniques to hip capsule, posterior chain mobility if needed
  - Self foam roller techniques, LAX balls to posterior hip if needed

- **Reinforce Left Hip Flexion Pattern**
  - Taping techniques to lumbar spine to give 24 hour feedback to reinforce initiating hip hinge patterns and neutral spine with sitting, bending, transitions from sit to stand and stand to sit movements
    - Kinesiotape/Rocktape, McConnell taping/Leukotape

- **Reload Left Hip Flexion Pattern (4x4 Matrix)**
  - 4 Positions: NWB (1), Quadruped (2), Kneeling (3), Standing (4)
  - 4 Types of Resistance: No resistance/Pattern Assistance (1), No resistance (2), Resistance/Pattern Assistance (3), Resistance (4)
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<th></th>
<th>Non-Resisted/PA</th>
<th>Non-Resisted</th>
<th>Resisted</th>
<th>Resisted/PA</th>
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<tbody>
<tr>
<td>Supine</td>
<td>1x1</td>
<td>1x2</td>
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<td>Quadruped</td>
<td>2x1</td>
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<td>Kneeling</td>
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<td>Standing</td>
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1x1: Supine Assisted Left Active Straight Leg Raise

2x3: Quadruped Resisted Hip flexion against Swiss Ball with mini band around
3x3: Tall Kneel assisted hip hinge with mini band around knees

4x1: Toe Touch Progression with toes up on half roller and mini band
Conclusion

PT is the BEST initial angle of attack for any LBP (except red flags)
We need a specific treatment approach for our specific movement dysfunction.
Mobilize the hypomobile segments/regions and stabilize the hypermobile ones
We all need a little of both
Find Exercises that are Efficient and Effective!! More bang for your buck
Look for PTs that have good communication skills, up to date manual skills and exercise knowledge
- SI joint dysfunction is common with all forms of LBP
  - Generally needs manual work from PT/chiro, difficult to mobilize yourself
- Piriformis Syndrome looks a lot like lumbar radiculopathy
  - Responds well to direct/aggressive myofascial release: ROLL IT

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<th>SI joint Dysfunction</th>
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<tr>
<td>• Can’t stand still</td>
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<td>• Can radiate down posterior leg</td>
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<th>Piriformis Syndrome</th>
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<tr>
<td>• Difficulty Sitting</td>
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<td>• Mimics “sciatica”</td>
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<tr>
<th>Lumbar Disc/Radiculopathy</th>
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<tr>
<td>• Morning pain</td>
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<td>• Pain with coughing/sneezing</td>
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<td>• Changes in reflexes, dermatomes, myotomes</td>
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References

- Selective Functional Movement Assessment; Advanced Clinical Integration Course Manual 2013.