

# Lower Crossed Syndrome

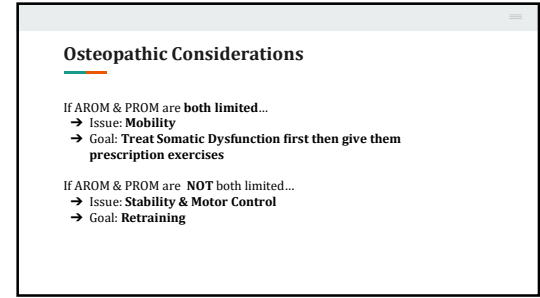
Presentation by Ashley Hooper, OMS-III,  
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Overseen by Ellice Goldberg, DO, FACOFP



## Road Map

- Osteopathic Considerations
- Anatomy Review
- Causes of Lower Crossed Syndrome
- Diagnosis of Lower Crossed Syndrome
- Exercise Prescription



## Osteopathic Considerations

If AROM & PROM are **both limited**...

- Issue: **Mobility**
- Goal: **Treat Somatic Dysfunction first then give them prescription exercises**

If AROM & PROM are **NOT** both limited...

- Issue: **Stability & Motor Control**
- Goal: **Retraining**

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Anterior Anatomy	
Weak/Inhibited	Tight/Facilitated
<ul style="list-style-type: none"><li>• Rectus abdominus</li><li>• Abdominal oblique</li><li>• Transversus abdominis</li><li>• Vastus lateralis,medialis, intermedius</li><li>• Tibialis anterior</li></ul>	<ul style="list-style-type: none"><li>• Rectus femoris</li><li>• Iliopsoas</li><li>• Tensor fascia lata</li><li>• Thigh adductors</li></ul>

Posterior Anatomy	
Weak/Inhibited	Tight/Facilitated
<ul style="list-style-type: none"><li>• Glut Med/Min/Max</li></ul>	<ul style="list-style-type: none"><li>• Lumbar erector spinae</li><li>• Quadratus Lumborum</li><li>• Piriformis</li><li>• Hamstrings</li><li>• Gastrocnemius</li></ul>

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### Muscle Tone

- Tonic=Postural
- Hypertonic=Tight=Facilitated
- Slow Twitch (I) Fibers
- Oxidative Metabolism
- Low Myosin ATPase Activity
- High Capillary Density (Red)
- $\alpha_2$ -motor neuron
- Reacts to functional disturbance by shortening
- Phasic=Dynamic
- Weak=Inhibited
- Fast Twitch (II) Fibers
- Glycolytic Metabolism
- High Myosin ATPase Activity
- Low Capillary Density (White)
- $\alpha_1$ -motor neuron
- Reacts to functional disturbance by weakening

### Fascial Straps

Weak: Abdominals

Tight: Thoracolumbar extensors

Tight: Hip flexors

Weak: Gluteus maximus

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### Causes of Lower Crossed Syndrome

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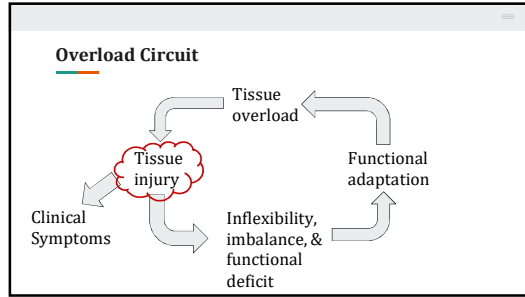
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### Causes of Lower Crossed Syndrome

- Chronic mechanical and structural stress
- Improper sitting mechanics
- Gait abnormalities
- Acute injury or trauma



### Diagnosing Lower Crossed Syndrome: Muscle Firing Patterns and Special Tests

Special Tests

1. Pelvic Clock
2. Pelvic Clock with Hip Abduction
3. Pelvic Clock with Heel Slide
4. Hip Abduction Firing Pattern
5. Hip Extension Firing Pattern

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### Pelvic Clock

- Pt is supine & imagining a bowl of soup or clock on their belly
- Physician monitors bil ASIS for levelness
- Pt tilts pelvis 1-2 inches in following directions
  - Posterior: umbilicus toward 12 o'clock position
  - Anterior: umbilicus toward 6 o'clock position
  - Right: umbilicus toward 9 o'clock position
  - Left: umbilicus toward 3 o'clock position
- Failure to keep ASIS's level signifies inhibited/weakened abdominal muscles and facilitated lumbar erector spinae or quadratus lumborum




### Pelvic clock with Hip Abduction

- Pt is supine with knees bent and feet on table
- Physician monitors bil ASIS's
- Pt tilts pelvis posteriorly (toward 12 o'clock)
- While maintaining posterior pelvis tilt, pt lets knees fall laterally (abducts hips)
- Failure to keep ASIS's level indicates weakness of abdominal muscles or facilitation of thigh abductors



### Pelvic Clock with Heel Slide

- Pt supine, knees bent, feet on table
- Physician monitors pt's lumbar lordosis and ipsilateral ASIS
- Pt tilts pelvis posterior (toward 12 o'clock position). Lumbar lordosis should decrease
- Pt maintains posterior tilt while sliding heels along table until knees and hips are straight. Physician monitors for any lumbar lordosis increase.
- Increased lumbar lordosis or unleveling of ASIS's indicates inhibited abdominal muscles and facilitated hip flexors




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### Normal Hip Abduction Firing Pattern

1. Gluteus medius
2. Tensor fascia lata
3. Quadratus lumborum
4. Lumbar erector spinae

• If tensor fascia lata contracts before gluteus medius, the patient's hip will be **internally rotated and flexed**



### Assessment of Right Hip Abduction Firing Pattern

- Pt lays on left side
- Physician places right hand on pt's right gluteus medius and tensor fascia lata, and left hand on right quadratus lumborum and erector spinae
- Pt slowly raises right leg (ie abducts right leg)
- Observe muscle firing pattern



### Normal Hip Extension Firing Pattern

1. Hamstrings
2. Gluteus maximus
3. Contralateral lumbar erector spinae
4. Ipsilateral lumbar erector spinae

• Complete lack of gluteus maximus firing or lumbar/thoracic erector spinae firing before gluteus maximus indicates **inhibited gluteus maximus** and **facilitated hip flexors and erector spinae**



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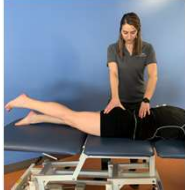
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### Assessment of Right Hip Extension Firing Pattern

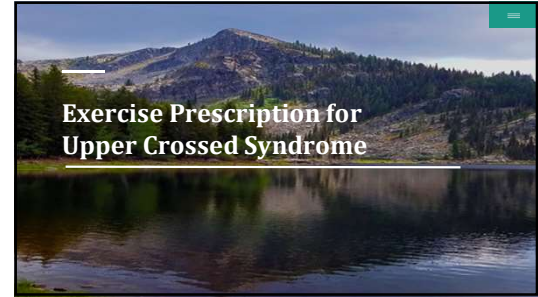
- Pt is prone
- Use caudad hand to monitor right hamstrings and gluteus maximus. Use cephalad hand to monitor bilateral lumbar erector spinae
- Pt slowly lifts/extends leg off table
- Observe hip extension firing pattern



### Osteopathic Considerations

- If AROM & PROM are **both** limited...
  - Issue: **Mobility**
  - Goal: **Treat Somatic Dysfunction first then give them prescription exercises**
- If AROM & PROM are **NOT** both limited...
  - Issue: **Stability & Motor Control**
  - Goal: **Retraining**

### Exercise Prescription for Upper Crossed Syndrome



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**Goals in Exercise Prescription**


1. Sensorimotor balance training
2. Stretch what is hypertonic before strengthening
3. Reeducate movement patterns and retrain what is weak



**Step One**  
**Sensorimotor Retraining**

**Proprioceptive Retraining**

- Create a "short foot"
- Retrain at level that is failed and progress once this level is mastered
- Can be utilized for both lower crossed and upper crossed syndromes



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### Proprioceptive Retraining

- Normal is the ability to hold each stage for 30 seconds

**Stages:**

1. Balance on one foot, arms down, eyes open
2. Balance on one foot, arms crossed, eyes open
3. Balance on one foot, arms down, eyes closed
4. Balance on one foot, arms crossed, eyes closed



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### Step Two Lower Extremity Stretches



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### Iliopsoas/ Anterior Hip Capsule Stretch

- Pt is prone with knee flexed
- Grasp distal femur
- Block pelvic motion at the iliotibial band
- Extend the hip by elevating the leg
- Goal: able to lift the leg 6 inches



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### Iliopsoas Self Stretch

- Pt is standing
- Perform a low lunge
- Internally rotate the femur on the side to be stretched and contract your gluteal muscles on the same side.
- Stretch both sides for symmetry



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### Rectus Femoris Stretch & Self Stretch

- Pt is prone
- Grasp the distal end of the tibia and flex knee to the barrier
- Utilize isometric muscle energy to stretch
- Self stretch: flex knee to barrier, tilt pelvis posteriorly. Repeat on both sides.
- Goal: Heel touching buttocks



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### Piriformis Stretch

- Pt is supine
- Flex hip and knee
- Induce adduction and internal rotation of flexed leg
- Have patient attempt abduction and external rotation of flexed leg



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### Hip Adductor Stretch

- Pt is supine
- Long Adductors: stand in between patients legs.
- Grasp affected legs' ankle and abduct leg
- Stabilize contralateral leg
- Short Adductors:
  - Pt flexes knee of affected leg with foot resting on table. Physician abducts leg until barrier is reached.
  - Stabilize contralateral ASIS
- Both short & long adductors: pt contracts adductors while slack is



## Step Three Muscle Retraining



### Gluteus Medius Retraining

- Pt is in lateral recumbent position with knees flexed to 45-60 degrees with dysfunctional gluteus medius up
- Pt places hand on gluteus medius near iliac crest attachment to feel firing
- Pt will keep feet together and lift top knee towards the ceiling, holds this position for 10 seconds, then lowers the leg back to starting position



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### Gluteus Maximus Retraining

- Pt is prone
- Dorsiflex ankle of the side that is to be strengthened
- Contract gluteus maximus, lifting the foot off the table and plantarflex for 10 seconds
- Return to starting position



### References

Bookhout, Mark R., Geraci, Michael, and Greenman, Philip. Exercise Prescription as an Adjunct to Manual Medicine

Myers, Thomas W. Anatomy Trains. London: Elsevier, 2014.

Pierce-Talsma, Stacey. Diagnosis and Treatment of the Upper and Lower Crossed Syndromes. Lecture presented at: RVUCOM; April 2019, Parker, CO.

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