The Core: Prevention and Treatment of Low Back Pain

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Goals of this presentation

Discussion of possible causes of Low Back Pain
To educate about the essential role of “The Core” in examining a patient with Low Back Pain
Provide tools for the physician in educating his/her patients about prevention and treatment of Low Back Pain
Low Back Pain

Massive topic
This is not an all-encompassing discussion of every possible cause of Low Back Pain
Instead, it is designed to increase awareness of causes that the physician may not have in the forefront of their mind
As Osteopathic Physicians, we have more in our toolbox then we realize!
Are you ready?
Case presentation:

35 yo male presents with 2 weeks of low and mid thoracic back pain. Pt reports pain is a dull ache, non radiating, and worse near the end of the day. Reports no pain relief with NSAIDS and pain seems to be exacerbated with exercise.
Case presentation:

PMH: None
PSH: Appendix @ 12 yo
FH: Maternal Hx: Diabetes
All: NKDA
SH: Current smoker- 1ppd, No ETOH
Case Presentation:

PE:
Gen: NAD, A&Ox3
CV: RRR S1 S2
Resp: CTA Bilaterally
Abd: NT ND +BS no CVA tenderness
Ext: +2/4 Bilateral DP, Moves all equally, Straight leg negative, + L Thomas Test
Case Presentation:

Osteopathic Examination:

C2 FSRl
C5FSRr
T3FSRr
T5ESRL
L5ESrRl

Thoracic Diaphragm: inhalation restriction
Hamstrings Bilaterally: Hypertonic
Case Presentation:

+L Standing Flexion test
+L Seated Flexion test
Springing present at left Sacral Sulcus
Restricted springing at Left ILA
Sacrum: Left Sulcus Deeper, Left ILA inferior and Posterior
Case Presentation:

Hip Extension Movement Pattern Test: Flexion of the knee during hip extension
Hip Abduction Movement Pattern Test: Flexion at hip during hip abduction
Trunk curl up test: Limited kyphosis of upper trunk
Case Presentation:

Labs:

- Ca: 9.0
- Total Protein: 6.8
- Albumin: 4.2
- Globulin: 2.6
- TBili: 0.5
- Alk Phos: 46
- AST: 31
- ALT: 35
- Trigs: 87
- Cholesterol: 184
- HDL: 65
- LDL: 102
Diagnosis:

Unilateral Sacral Shear (unilateral flexion)
Somatic dysfunction of L5
Lower cross Syndrome
Treatment:

Muscle Energy to Sacrum
Muscle Energy to L5
Seated Muscle Energy to Cervical and Thoracic Vertebra
Muscle energy to Psoas
Thoracic Diaphragm release
Treatment

Home Exercise Prescriptions: Lower Crossed syndrome corrective exercises
Yoga poses
Physical Therapy

We will talk more about this stuff later...
Low Back Pain - for the physician, the pain is a little lower...

"I'M THE ONE WITH THE MEDICAL DEGREE. I'LL DETERMINE IF YOUR BACK IS BOTHERING YOU, OR NOT..."
Disability from lower back pain continues to be a major societal problem. The cost of care to the patient with industrial back pain continues to escalate and frustrates the health care delivery system, the insurance industry, and employers.
World Health Organization

States that LBP is responsible for an estimated 149 million work days lost in the United States every year. That works out to be approximately $100 to $200 billion a year.
So how do **WE** help our patients?
Differential Diagnosis

Medical: Cauda Equina, Urolithiasis, Renal Colic, Ectopic Pregnancy, Renal Cyst - Bleeding, Aortic Aneurysm, Cholecystitis, Posterior Wall Renal Infarction, Pelvic thrombophlebitis, Renal Embolism, Addison's Disease, Female Urethral Syndrome, Pelvic Congestion Syndrome, Hemolysis, Sickle Cell Crisis, Myoglobinemia, Hypervitaminosis A, Stress, Shingles, Psychiatric
Differential Diagnosis

And don’t forget!!!!!

SOMATIC DYSFUNCTION
Greenman’s Dirty Half Dozen

183 pts (79 men and 104 women) with an average age of 40.8 years who were disabled for an average of 30.7 months

53% working less than halftime
42% were not working
5% totally disabled
Greenman’s Dirty Half Dozen

84% found to have FRS or ERS in lumbar spine at L4-L5
75% had unleveling of the pubic symphysis
48.6% anterior nutation of the posterior sacral base
60% of surgical had posterior sacral base
Greenman’s Dirty Half Dozen

Short - leg, Pelvic Tilt syndrome: 63%
Only 2.7% of pts failed to demonstrate any of the dirty half dozen
Following Tx: 75% returned to full employment

Greenman Principles of Manual Medicine: p488
Greenman’s Dirty Half Dozen

1. Non Neutral Dysfunction within the lumbar spine (FRS dysfunctions) in Lower Lumbar
2. Dysfunction at Symphysis Pubis
3. Restriction of anterior nutation movement of the sacral base (Torsion or Extended Sacrum)
Greenman’s Dirty Half Dozen

4. Innominate shear dysfunction
5. Short leg, Pelvic tilt syndrome
6. Muscle imbalance of the trunk
So why is the CORE so important?
The Core as we define it
http://abduzeedo.com/da-vincis-vitruvian-man- Storm Trooper - Dacinci
The Core

For us, this includes the skeletal, arthrodial, and myofascial structures and their related vascular, lymphatic, and neural elements from approximately the thoracic diaphragm to the mid thigh.

This, however, does not exclude structures that originate or insert elsewhere.
Major Players
Thoracic Diaphragm

- Xiphoid process
- Inferior vena cava in caval opening
- Impression for liver
- Medial arcuate ligament
- Lateral arcuate ligament
- 12th rib
- Right crus
- 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th ribs
- Esophagus in esophageal hiatus
- Central tendon of diaphragm
- Costal cartilage
- Impression for stomach
- Median arcuate ligament crossing aorta
- Quadratus lumborum (cut)
- Psoas major (cut)

(a) Inferior view
Thoracic Diaphragm

Primary muscle of respiration
Aids in the pumping of lymph and blood throughout the body
Origin: Xiphoid process, inner surface of the 7th-12th ribs; anterior surfaces of the L1-3 vertebrae; fascia over quadratus lumborum; psoas major muscles via the medial and lateral arcuate ligaments
Thoracic Diaphragm

Insertion: Central tendon of the diaphragm
Inferior vena cava, Abdominal Aorta,
Esophagus, Azygos Vein, Thoracic Duct,
Sympathetic trunk all pass through the diaphragm
B The diaphragm, inferior view

- Vena caval aperture
- Sternocostal triangle (Larrey's clef)
- Electrode positioning for endoluminal procedures
- Central tendon
- Median arcuate ligament
- Aortic aperture
- External oblique
- Lumbar part of diaphragm, right crus
- Internal oblique
- Transversus abdominis
- Quadratus lumborum
- Psoas major
- Vertebral body
- Intrinsic back muscles
- Medial arcuate ligament (psoas arcade)
- Lumbocostal triangle (Bochdalek's triangle)
- Lateral arcuate ligament (quadratus arcade)
- Costal part of diaphragm
- Esophageal aperture
- Lumbar part of diaphragm, left crus
- Latissimus dorsi
Iliopsoas (1 psoas major and 2 iliacus)*

**Origin:**
- **Psoas major (superficial layer):** lateral surfaces of the T12 vertebral body, the L1–L4 vertebral bodies, and the associated intervertebral disks
- **Psoas major (deep layer):** costal processes of the L1–L5 vertebrae
- **Iliacus:** iliac fossa

**Insertion:** Insert jointly as the iliopsoas muscle on the lesser trochanter of the femur

**Action:**
- Hip joint: flexion and external rotation
- Lumbar spine: unilateral contraction (with the femur fixed) bends the trunk laterally, bilateral contraction raises the trunk from the supine position

**Innervation:** Femoral nerve (T12–T14) and direct branches from the lumbar plexus
**Quadratus lumborum**

**Origin:** Iliac crest  
**Insertion:** Twelfth rib, costal processes of the L1–L4 vertebrae  
**Action:**  
- Unilateral: bends the trunk to the same side  
- Bilateral: bearing down and expiration  
**Innervation:** Subcostal nerve (twelfth intercostal nerve)
Arrangement of abdominal wall muscles and rectus sheath
Pelvic Diaphragm

Very important - especially in women
There is a lot of trauma that can occur to this area
Function plays an essential role in abdominal muscle strength and stability of the lumbar spine
Frequently there is reduction in available active motion due primarily to myofascial shortening.
Linea Alba

Flat band of connective tissue where rectus abdominus, the internal and external oblique, and transverse abdominis join into a single tendinous band.

Attaches superiorly from the xiphoid process, inferiorly to symphysis pubis.
Inner abdomen

Where many major organs reside
The organs have movement, too!
Peritoneum allows sliding of the organs along
the inner surface of the abdominal wall
The SI joint
So how do we prevent low back pain?
“Stressed myofascial structures undergo sustained changes in length…. New collagen forms with a half life of 10-12 months, realigns the connective tissue in response to vectors of stress and perpetuates postural problems.”

Foundations of Osteopathic Medicine
“When stressed some muscles become tight and facilitated and others become weak and inhibited.”

Vladimir Janda (1928- 2002)
Muscle Imbalances

Upper cross syndrome
Lower cross syndrome
Middle cross syndrome
Layered Syndrome
Normal Active Posture
Active Rigid Posture

Passive Slumped Posture
Lower Crossed Syndrome

- Tight (Facilitated) Lumbar Erector Spinae
- Weak (Inhibited) Abdominal Muscles
- Weak (Inhibited) Gluteals (Gluteus Maximus, Medius and Minimus)
- Tight (Facilitated) Hip Flexors (Rectus Femoris and Iliopsoas)
Anterior Pelvic Tilt
Lower Crossed Syndrome

Postural Changes:

- Thoracolumbar hyperkyphosis
- Lumbar hyperlordosis
- Slight hip flexion
- Anterior pelvic tilt
- Slight knee flexion

- Head protraction
- Thoracic hyperkyphosis
- Lumbar hypolordosis
- Knee recurvatum
- Trapezius and levator scapula tight
- Deep neck flexors weak
- Weak rhomboids and serratus anterior
- Tight pectoralis
- Erector spinae tight
- Abdominals weak
- Weak gluteus maximus
- Tight iliopsoas
Lower Crossed Syndrome

Common Dysfunction:
- L4-L5
- L5-S1
- SI joint
- Hip Joint
So how do we diagnose Lower Cross Syndrome?

Hip Extension movement pattern test
Hip Abduction Test
Trunk Curl Up Test
Upper Crossed Syndrome

Tight: Upper Trapezius/Levator Scapulae and Suboccipitalis

Weak: Cervical Flexors, Rhomboids, and Lower Trapezius
Upper Crossed Syndrome

Posture:
Forward Head Posture

Increased Cervical lordosis

Thoracic kyphosis

Elevated and Protrated shoulder

Abduction/Winging of the Scapula
Upper Crossed Syndrome

Dysfunction:
OA
C4-C5
Cervicothoracic junction
T4-T5
Upper Cross Syndrome

Cervical Flexion Movement Test
Push up Movement Test
Push Up movement Test
Shoulder Abduction Test
Layered Syndrome

Weak muscles
- Lower stabilizers of the scapula
- Lumbosacral erector spinae
- Gluteus maximus

Tight muscles
- Cervical erector spinae
- Upper trapezius
- Levator scapulae
- Thoracolumbar erector spinae
- Hamstrings
Middle Crossed Syndrome

Dysfunction of the Anterior and Posterior Oblique Slings which lead to imbalance of the system.
So what are these Slings?
Middle Crossed Syndrome

Anterior Oblique Sling:
Thoracolumbar Fascia
Middle Cross Syndrome

Assessment:
Gait Analysis: Weak anterior oblique sling will result in deviation of the umbilicus towards the weak shoulder.
Middle Cross Syndrome and implications for mechanics
Middle Cross Syndrome

Active Straight Leg Raise:

Middle Cross Syndrome

It's Easy!
OMT treatment plan

Important to both relax the tight muscles as well as strengthen the weak ones.
Can use muscle energy to isometrically engage weak muscles.
Also pay attention to myofascial aspects of the core.
Thoracic and pelvic diaphragms.
5 minute treatment plan

Thoracic diaphragm release
Pelvic diaphragm release
Muscle Energy for the Sacrum
Muscle Energy for L5
So we treat them, now what do we give our patients?
Exercises!
Yoga - my personal favorite

Quickly becoming popular
Beneficial for patients and providers if done correctly
Corrects some of this core imbalance we have been talking about

Quick shoutout to Ray Long, MD, Orthopedic Surgeon who has contributed greatly to my yoga anatomy knowledge and is responsible for this neat image:
Studies about yoga and low back pain

Study published in the Journal of Back Musculoskeletal Rehabilitation in 2015 shows that yoga is safe and effective for those with pain from bulging discs and/or sciatic pain.
Yogis think that

Light contraction of the abdominal wall muscles at the same time as pelvic floor contraction = the “Airbag Effect”
The “Airbag” Effect
Airbag, Abdominal Press, Same thing...
Abdominal Press

Simultaneous contraction of thoracic diaphragm, abdominal muscles, and pelvic floor muscles

Important for raising intra-abdominal pressure in order to expel things

Also important in order to stabilize the spine - reduces pressure on the spine (especially the lumbar spine)
Bandhas

Bandhas are considered to be an energetic lock in yoga
Mula Bandha corresponds to contraction of the pelvic floor
This action helps support the inner organs as well as the spine
4 poses to fix Upper Crossed Syndrome

Bolster supported corpse pose
Upward facing plank
Cow-faced pose
Warrior 2
4 poses to fix Lower Crossed Syndrome

Triangle pose
Downward-facing dog
Bridge pose presses
Plank pose on forearms
And if all else fails...

Have the patient do
Kegels and BREATHE
deeply
To revisit our patient...

Pt was seen for follow up 2 weeks later. He reported decrease pain in his low back and cited feeling stronger from doing his prescribed exercises as well as Physical Therapy.

Re-examination revealed resolution of Somatic Dysfunction at Lumbo-Sacral Junction.
Planks.
Do them.

randomhealthtips.tumblr.com
That's all Folks!
Resources


Essential Anatomy 5 iPad application


OMT LAB

First we will do some Upper, Lower, and Middle Crossed Syndrome testing
Then we will learn some quick office treatment techniques
5 minute treatment plan

Thoracic diaphragm release
Pelvic diaphragm release
Muscle Energy for the Sacrum
Muscle Energy for L5
Thoracic Diaphragm release

Figure 6.8 Lateral compression for the lower ribs and respiratory diaphragm

Contact the lower ribs with your palms. Direct the force medially toward the xiphoid. Maintain a balanced tension until a release is felt.

Steven Simmons
1. Contact the pelvic diaphragm with your thumb. Follow the natural curve of the medial surface of the ischial tuberosity. The applied force should be in a superior and lateral direction.

2. Be sure to treat both layers.
Muscle Energy for the Sacrum
Muscle Energy for L5