

Parasympathetic Considerations in Micturition

Developed for OUCOM CORE

by

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CORE Osteopathic Principles and Practices Committee

Session #10 – Series B: Fluid Considerations



This lab will discuss parasympathetic influences, but with micturition, both parasympathetic and sympathetic systems are essential. This lab will discuss both.

- We produce 1 ml of urine per minute
- Urine produce from 180 liters of filtrate per day
- Micturition is controlled via the:
 - Frontal lobe
 - Pons
 - Spinal cord
 - Splanchnic and skeletal muscle nerves




- **Micturition center** of the brain is located in the Frontal Lobe.
- This center is primarily inhibitory: it sends **Tonic Inhibitory** signals to the **Detrusor** muscle of the bladder, until an appropriate time to void.
- When urination appropriate, brain sends **excitatory** signals to the **Pons**, allowing voiding.



***Next stop:
Pons Micturition Center (PMC)***

- As the bladder fills, perception of bladder fullness creates the desire to void.
- The **Pons Micturition Center (PMC)** sends
 - **Parasympathetic** signals to the **Detrusor** muscle causing it to contract
 - The PMC sends **inhibitory** signals through the **puddental** nerve, causing the **external sphincter** to relax
 - The result is ***micturition*** !



- The PMC is affected by ***emotions***
- Hence, some of us urinate when we are excited or frightened
- The frontal lobe's control of the PMC is part of the social training that children experience during growth and development (and is sometimes temporarily lost during college weekends) 
- Frontal Lobe Micturition center takes over the control of the PMC at age 2 - 4 years



Two way street: Spinal Cord

- **Function**

- Long communication pathway between the brainstem and the sacral spinal cord
- Sensory information from bladder → Sacral cord → Pons → Brain → Pons → Spinal cord → Sacral cord → Bladder

- **Normal bladder filling/emptying**

- Spinal cord acts as an important intermediary between the pons and the sacral cord
- Intact spinal cord is critical for normal micturition



- Allows bladder to increase capacity without increasing detrusor resting pressure
- Stimulates the internal urinary sphincter to remain tightly closed
- Inhibits parasympathetic stimulation
- Therefore, **sympathetic activity inhibits micturition reflex**



- Immediately preceding parasympathetic stimulation:
 - Sympathetic influence on the internal urethral sphincter becomes suppressed, so that the
 - Internal sphincter relaxes and opens



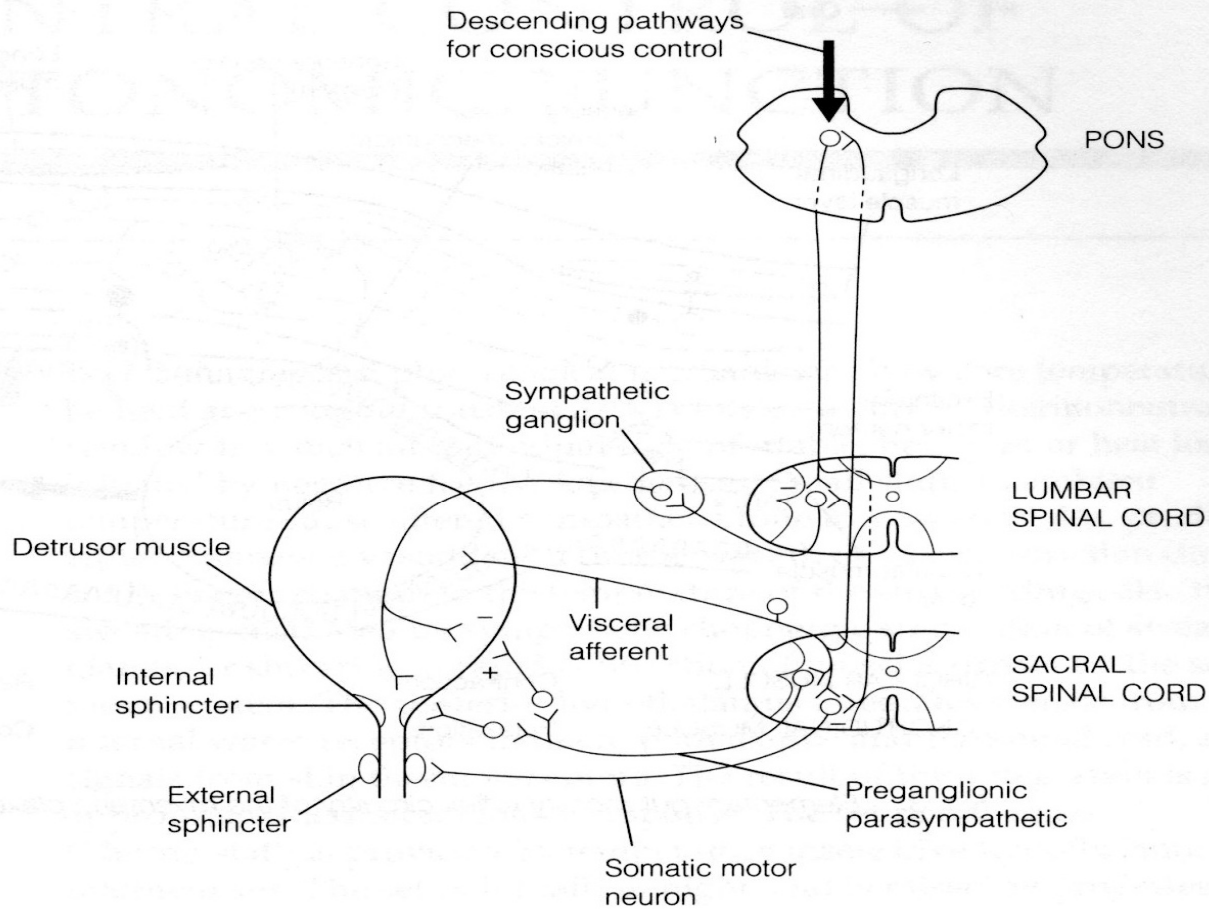
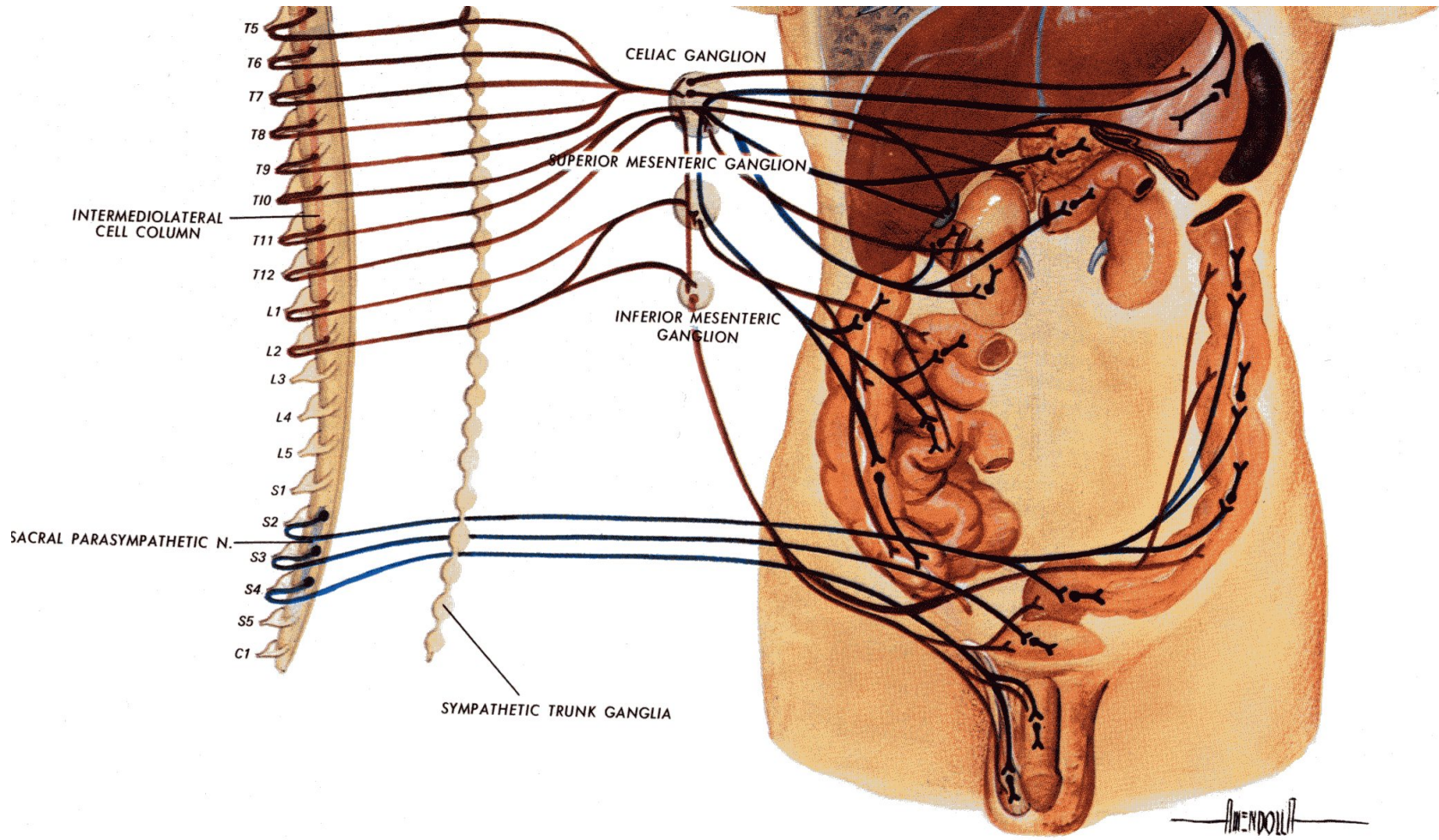


Fig. 2. Control of the urinary bladder. +, Excitatory; -, inhibitory; synapses without a symbol are excitatory.



- Sympathetic fibers to the bladder arise from T12-L2
- Parasympathetic fibers arise from the sacral plexus S2-S4
- Somatic dysfunction in either region may upset the balance between sympathetic and parasympathetic innervation potentially causing:
 - Urgency
 - Nocturesis
 - Incontinence





- In severe cases, lumbar disc protrusion may cause irritation of the sacral nerves, results in:
 - **detrusor hyperreflexia**
- Acute compression of sacral roots (trauma), may result in:
 - **detrusor areflexia**



Evaluate thoracolumbar region and sacral region for somatic dysfunction:

- **Tissue texture change**
- **Asymmetry**
- **Range of motion**
- **Tenderness**





INTEGRATE:

Orthopedic
Neurologic
&
Structural

EXAMS

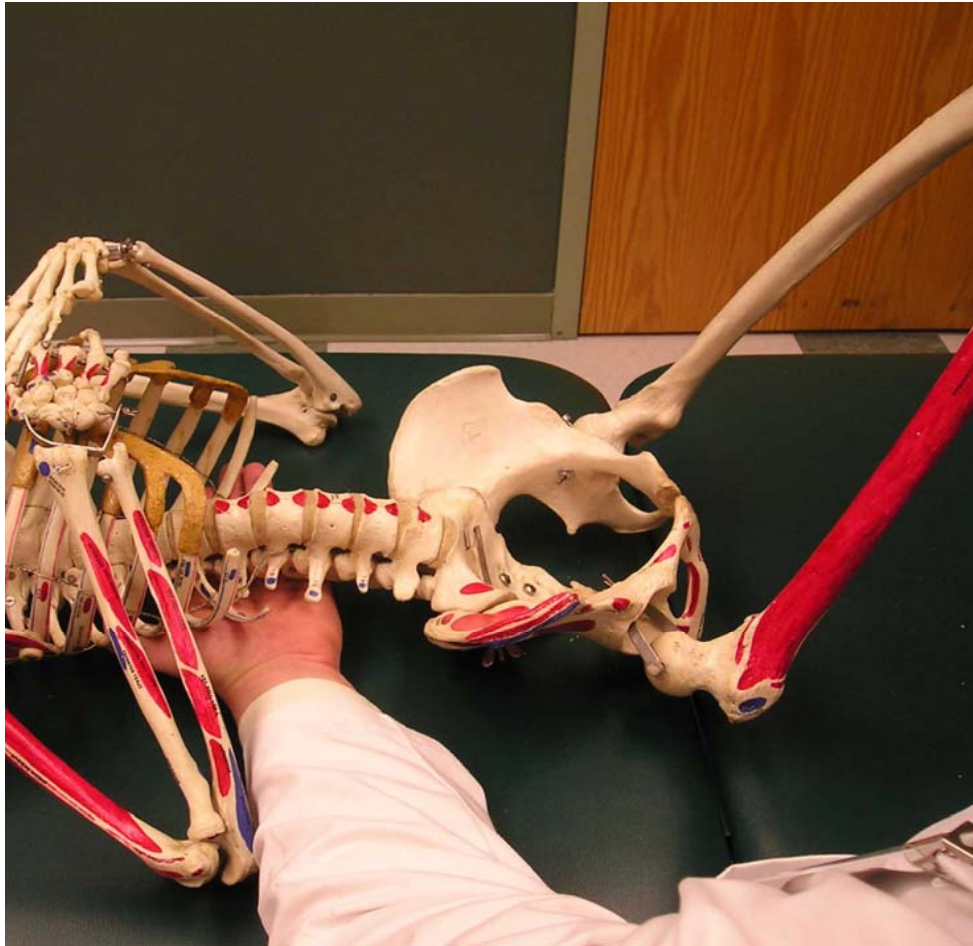


1. Learn an indirect - direct method of treating the thoracolumbar junction (**sympathetic innervation to the bladder**)
2. Learn a unique method of strain-counterstrain to treat sacral tenderpoints (**parasympathetic innervation to the bladder**)



- This technique uses old style osteopathic technique, sometimes now referred to as “*Still Technique*”
- This is summarized as:
 - Exaggeration (indirect action)
 - Release
 - Replace (direct action)
- The thoracolumbar junction is an excellent area to learn or practice this manual approach because the action is limited to one plane - rotation





- Operator seated to one side
- Patient supine
- Feet together, knees bent
- Operator's Caudad hand on top of the bent knees
- Cephalad hand under thoracolumbar junction

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Jordan/Escobedo/Morris

- By moving knees toward and away from you, feel for the directions of ease versus restriction in the thoracolumbar junction
- Then bring the knees into the direction of ease; not to the end of the range of motion, but to where you *just* begin to feel restriction built in the tissues...





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- Hold in the indirect position and wait to feel tissue change
- This may take 30-60 seconds or more
- The release is usually felt as a slow 'creep', or slow release of tension in the tissues
- You may gently follow this release by moving the knees further in the indirect position as the release occurs
- Then...



Thoracolumbar Junction Direct



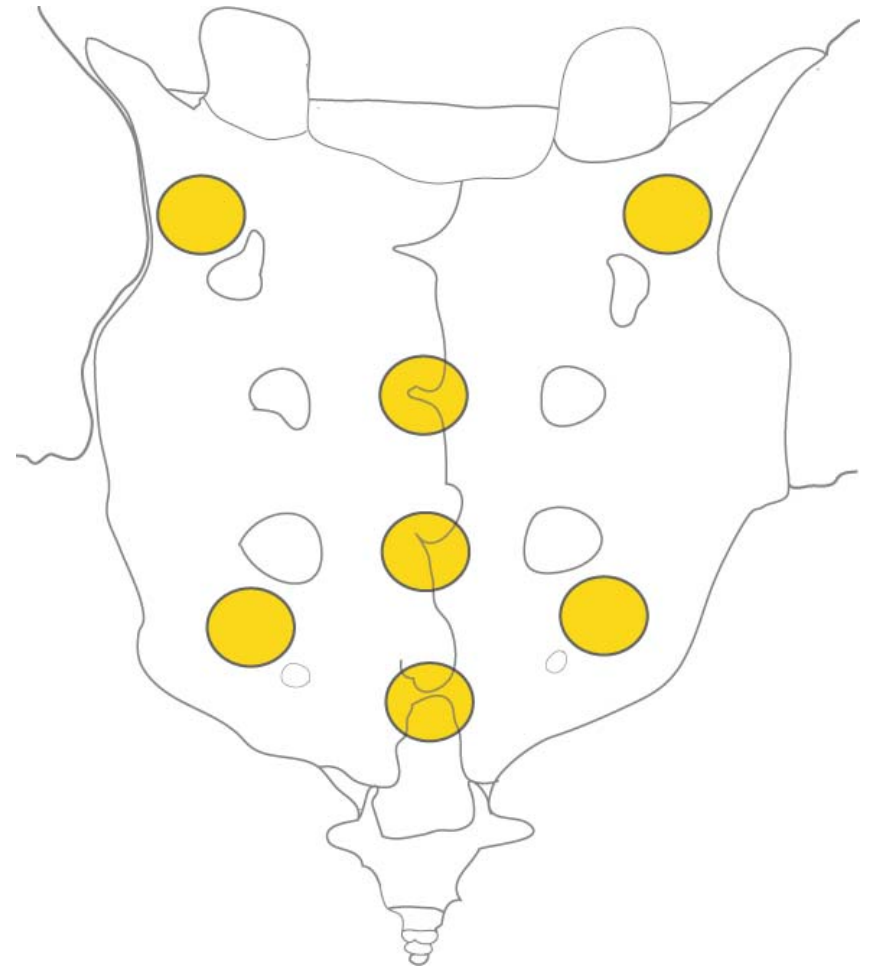
Jordan/Escobedo/Morris

- Take the knees in the opposite direction: rotating the thoracolumbar junction into the barrier, gently stretching the T-L junction
- Gently stretch the tissues until a change is felt
- Return legs to neutral position
- Re-test motion, repeat if necessary



- There have been seven tenderpoints identified on the posterior sacrum
- Somatic dysfunction in these tissues may be associated with pelvic visceral dysfunction
- Correction of these dysfunctions may help normalize lower parasympathetic function

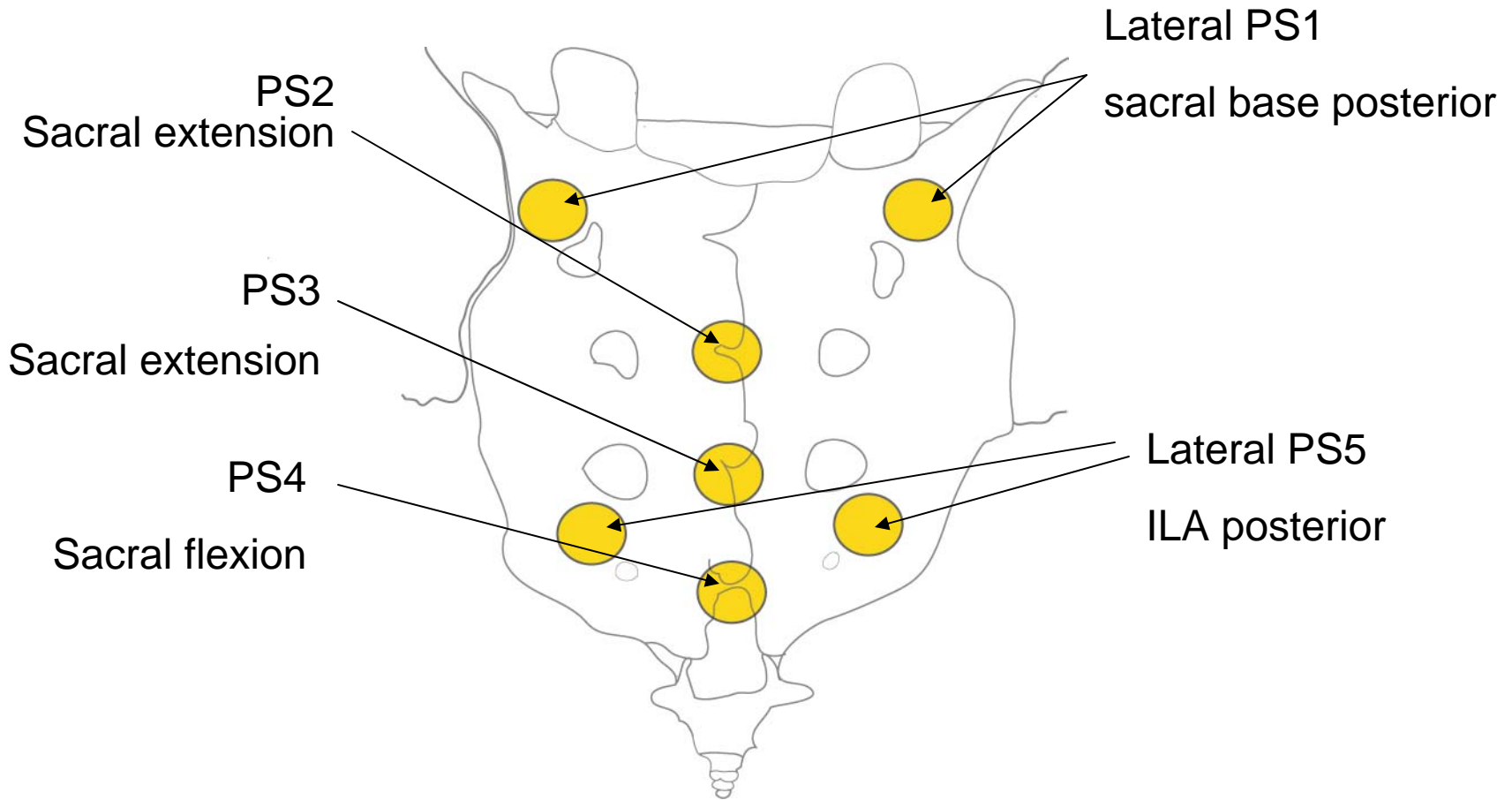
• Ramirez, et al. Low Back Pain:Diagnosis by six newly discovered sacral tender points and treatment with counterstrain
JAOA 1989;89:905-911.



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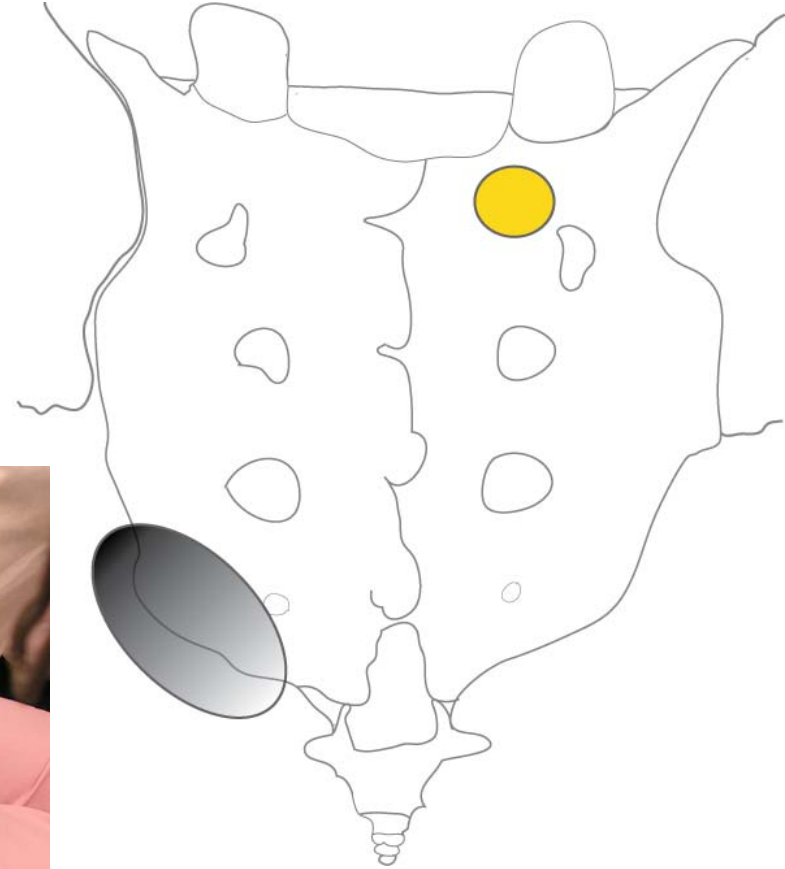
Sacral Strain-Counterstrain Nomenclature



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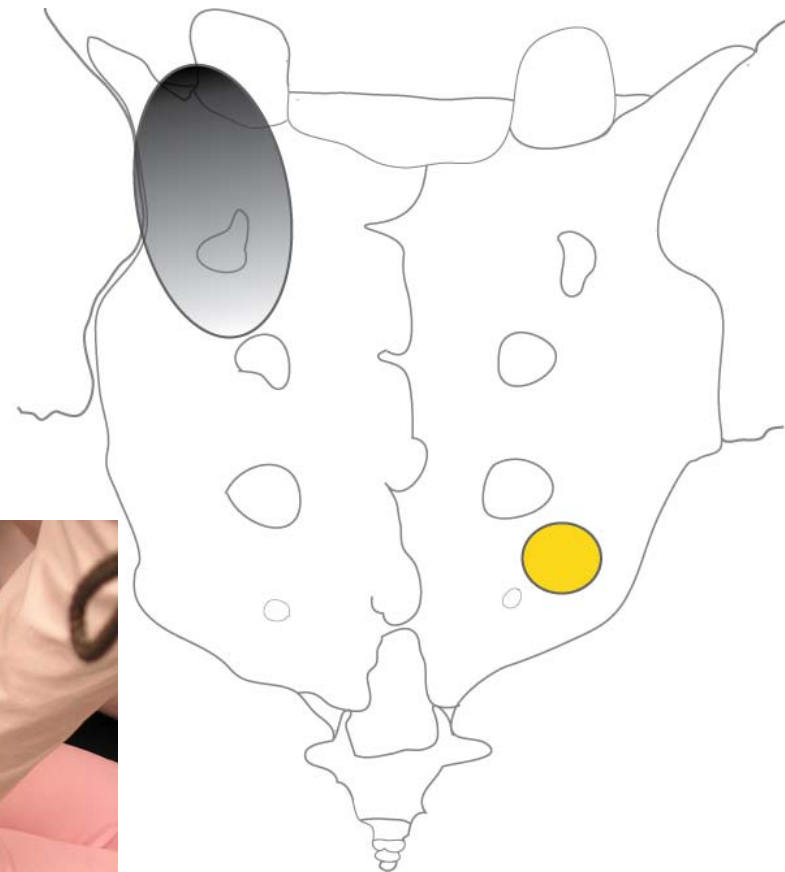
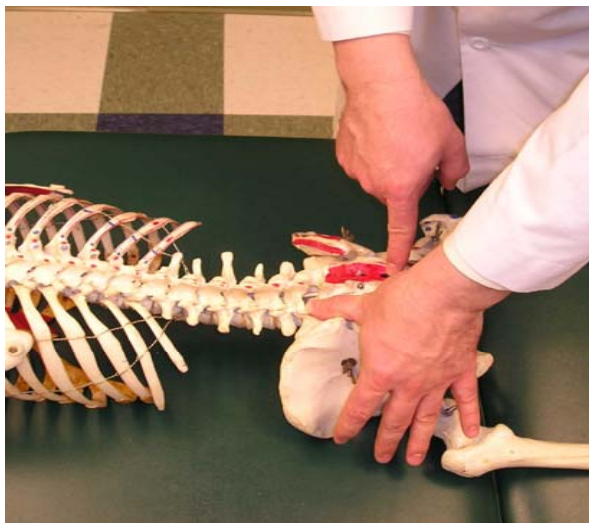
- Upper - outer pole tenderpoints are treated by applying firm downward pressure on the opposite pole of the sacrum



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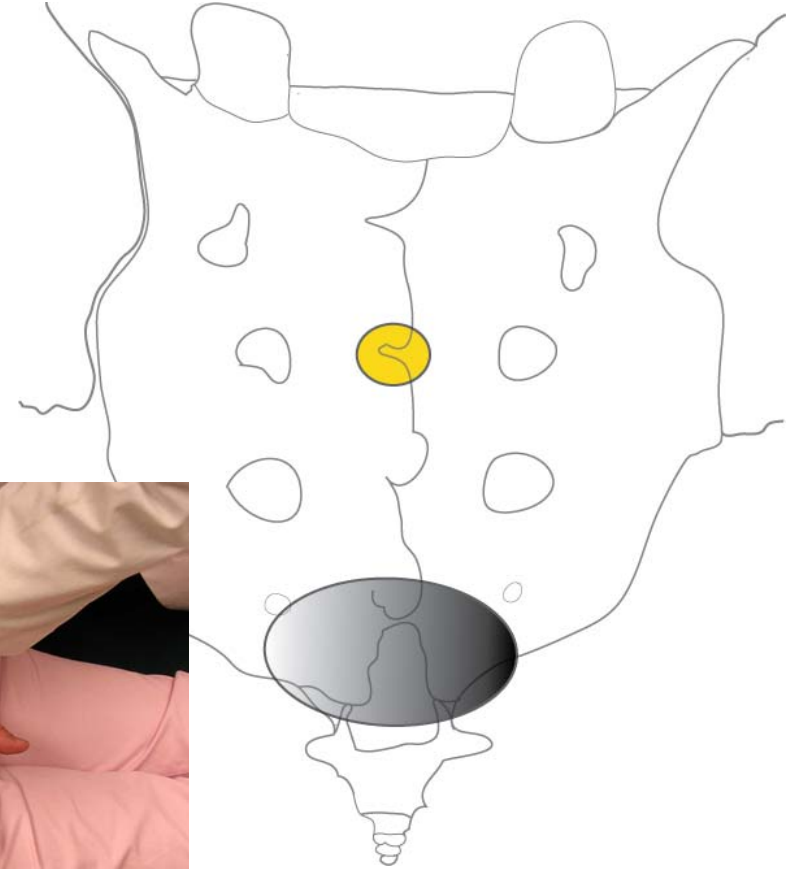
- Lower - outer pole tenderpoints are also treated by applying firm downward pressure on the opposite pole of the sacrum



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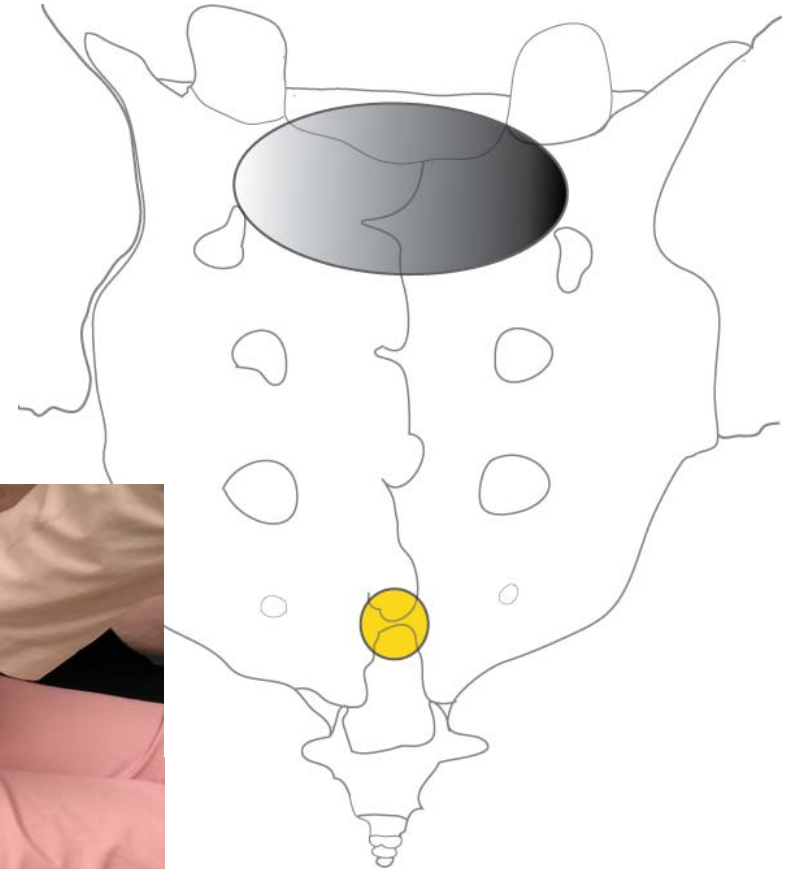


- Midline tenderpoints are treated by applying firm downward pressure on the opposite end of the sacrum (either base or apex)



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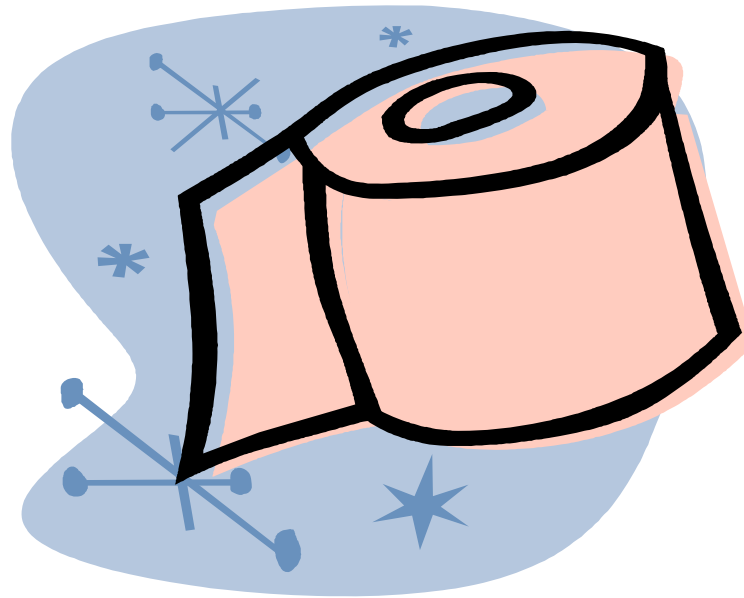




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Is this the end?



...yes



Kuchera, Kuchera. Osteopathic Considerations in Systemic Dysfunction. Greyden Press, 1994.

Ramirez, et al. Low Back Pain:Diagnosis by six newly discovered sacral tender points and treatment with counterstrain JAOA 1989;89:905-911.

Ward, ed. Foundations for Osteopathic Medicine, 2nd ed. Lippincott Williams & Wilkins, 2002.

And close observation of personal bladder function...

