The Pelvic Pain Puzzle

How Pain from the Pelvis is Processed

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Pelvic Specific Pain Phenomena
Patient Case #1

23 yo G1P1, 1 year s/p cesarean for failure to progress. She presents with complaint of 3 months of right hip pain. She recently went to another provider who found a painful nodule in the lateral edge of her cesarean scar. This was thought to be a fibroma, and was injected with steroids. The pain in her hip worsened after the injection.
Pelvic Specific Pain Phenomena
Patient case #2

28 yr old G3P3, history of 3 prior SVDs with a complaint of 6 years left lower quadrant pain and new onset pain with intercourse. She has seen three other physicians for this. She has had two ultrasounds of the pelvis which were read as normal. Her pain is described as shooting, stabbing, aching pressure, which is worse during menses and mid-cycle. She also notes that her pain worsened about 2 years ago, which coincided with her divorce. Over the last two months, she has become intimate with a new partner, and notices pain with penetration. It feels like he “hits something”. This reproduces the pain in her left lower quadrant.
Overview of the Pain Pathway

- Pain receptors in pelvis
- Spinal cord
- Lower midbrain “gateways”
- Midbrain limbic system + insular cortex
- Cortex
- Body response
What Triggers a Pain Signal

- **Neuropathic** pain signals: from nerves themselves
  - Cesarean scar burning - Patient case #1?
  - Diabetic tingling
  - Herpes Zoster pain

- **Nociceptive** pain signals: sensory neuron picking up possible threat
  - Patient case #2?
Different Types of Nociception

- **Visceral nociception**
  - Coming from internal organs
  - Stretch, inflammation, lack of blood flow
  - Often referred pain
    - MI
    - Cholecystitis
    - Appendicitis
  - Difficult for patient to localize
  - Difficult for patient to describe
  - Often accompanied by autonomic stimulation- nausea, sweating, elevated heart rate
  - Patient case #2?
Different Types of Nociception

- **Somatic nociception**
  - Coming from skin, muscle, bone, joint
  - Heat, crushing, cutting, burning, stretch, lack of blood flow, inflammation
  - Easily localized by patient
  - Easily described by patient
What Triggers a Nociceptive Signal

- Actual tissue damage
- Suspected tissue damage
RUBBER BAND EXPERIMENT
The Importance of Context

- Actual tissue damage
  - Car accident
  - Surgery
- Suspected tissue damage
  - Bodily context mimics actual tissue damage
  - Increased stress hormones
    - Cortisol
  - Anxiety, negative emotions
  - Immune system activation
  - Inflammation
  - Patient case #2!!
Suspected Tissue Damage - Stress

- Alters pain receptor activation thresholds
- Interferes with pain down-regulatory mechanisms
- Epigenetic changes in DNA methylation
- Specific pelvic syndromes affected by stress
  - IC/BPS
    - Cortisol predictive of symptoms
  - IBS
- Stress reaction in relation to pain
  - Innervation of the gut
  - Microbiome
The Gut Microbiome

- **Gut microbiome functions**
  - Breakdown of plant based food
  - Aids in digestion
  - Gut lining barrier function and development
    - Dysfunction highly related to inflammation
  - Immune system development
  - Estrogen metabolism

- **Affects and is affected by**
  - Inflammation/Immune system activation
  - Stress
  - Antibiotics
  - DIET
Suspected Tissue Damage - Anxiety/Depression

- Inter-connectivity
  - Pain causes depression
  - Depression increases pain signalling
- Known studied effects
  - Low back pain
  - Knee pain
  - Pelvic pain
  - Chronic regional pain syndrome
Suspected tissue damage - Inflammation

- Immune system activation
  - Food sensitivity
    - Gluten sensitivity
  - Celiac, Crohn’s, Eczema
  - Exposure to inflammatory organisms

- Microbiome

- Inflammatory markers
  - Mast cells
  - Lymphocytes
  - Cytokines, neurokines
Suspected tissue damage - Inflammation

- **Vulvodynia/Vestibulodynia**
  - Instigated by C. albicans
  - Immune activation when vulvar cells exposed to yeast

- **Endometriosis**
  - Blood vessel growth
  - Innervation

- **IBS**
  - Immune markers in lining of gut
  - Can be instigated by viral gastroenteritis

- **IC/BPS**
  - Mimics UTI symptoms
Pelvic Specific Pain Phenomena

- **Viscerovisceral Convergence**
  - Hypogastric plexuses
  - Convergence at spinal cord
  - Lack of topography in the thalamus

- **Viscerosomatic Convergence**
  - Visceral signals and somatic signals overlaid at spinal cord
  - Dorsal root ganglion of spinal cord
    - Small portion of signals from visceral nerves
    - Majority of signals from somatosensory nerves
  - Referred pain may be remote

- **Viscerosomatic reflex**
The brain doesn’t know where the pain is coming from. It guesses!
Lower Midbrain “Gateways”

- **Periaqueductal Gray**
  - Ascending and descending pain modulation
  - Stress induced analgesia
  - Pain anticipation
  - Pain distraction, DNIC
- **Cardiovascular control**
  - Vagus nerve
  - Heart rate/blood pressure

- **Thalamus**
  - Major pain relay station
  - Initial localization
  - Thalamic stroke- resistant chronic pain
Midbrain Limbic System and Insular Cortex

- **Contextual processing**
  - Insular cortex, amygdala, cingulate cortex, hippocampus, and hypothalamus.
  - Rollercoaster vs bear

- **Related functions**
  - Learned fear
  - Fight or flight
  - Pain related anxiety/depression
  - Sexual satisfaction
  - Aggression
  - Daydreaming
  - Basic emotions
  - Addiction, compulsion
  - Self-awareness
Cortical Processing of Pain

- **Networks**
  - Frontoparietal (anticipation of intensity)
  - Supplementary motor area, primary somatosensory cortex, and secondary somatosensory cortex

- **Increased nerve response**
  - Allodynia - normal stimuli
  - Hyperalgesia - painful stimuli

- **Change in motor cortex**
  - Excitability of cortical nerves
  - Altered brain morphology with chronic pain
  - Reorganization of intracortical circuits
  - Cognitive resources reallocated to pain processing
Pearls

- The pain your patient feels is real
- Context is everything
- The microbiome is powerful
- The fact that she can’t describe or localize the pain doesn’t mean she’s crazy
- Most pelvic pain patients aren’t med seeking
- There are ways to interfere with these processes to alleviate pain!
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Diagnosis: ilioinguinal nerve neuropathy
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Diagnosis: Interstitial cystitis, hypertonic pelvic floor dysfunction
References

• MacDermott RP. Treatment of irritable bowel syndrome in outpatients with inflammatory bowel disease using a food and beverage intolerance, food and beverage avoidance diet. *Inflamm Bowel Dis*. 2007;13(1):91-96.
References cont...

References cont...


