Pelvic Congestion Syndrome

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Agenda

- Introduce index patient
- Discuss pelvic congestion syndrome
  - Etiology
  - Menu of radiologic tests
  - Treatment options
- Review pelvic vasculature
- Companion Cases
Let’s meet our patient …
Ms. C: Initial presentation

- Ms. C is a 57 year old G3P2 post-menopausal woman who presents with one year of left lower quadrant pain
  - Nagging pain
  - Worse at night
  - Often presents late in the afternoon after prolonged periods of standing
Chronic Pelvic Pain: Overview

- Pelvic pain lasting greater than 6 months
  - Not cyclical or intercourse related
  - Often refractory to analgesic therapy with narcotics
- Estimated cause of 10-40% of outpatient gynecologist visits
- Etiology often elusive
  - Patients can have extensive workups including laparoscopy in search of cause
- Differential diagnosis is broad and includes endometriosis, adhesions, fibroids and pelvic varicosities

As part of her workup for pelvic pain, Ms. C had a transvaginal ultrasound which showed dilated pelvic veins, compatible with pelvic congestion syndrome.
Pelvic Congestion Syndrome (PCS): Overview

- **Overview**
  - Dilated gonadal and pelvic veins determined as cause of chronic pelvic vein
  - Affects primarily multiparous women of childbearing age
  - Symptoms include pelvic pain, dyspareunia, thigh and vulvar varices
  - Controversial as a diagnostic entity → mostly a diagnosis of exclusion

- **Pathophysiology**
  - Dilated pelvic veins with retrograde flow
  - Stretch of engorged veins causes pain
  - Can cause mass effect with symptoms such as constipation and bladder incontinence
  - Can be bilateral, but left more often affected than right

- **Etiology**
  - Poorly understood
  - Hormonal factors are a likely contributor given that pre-menopausal women are primarily affected
  - Mechanical factors
    - Absent or incompetent valves
    - Left renal vein variants associated with a higher incidence of pelvic varices

- **Treatment**
  - No established medical treatments
  - Surgical treatments include pelvic vein embolization and laparoscopic ligation of ovarian veins
Pelvic Congestion Syndrome is both diagnosed and treated radiologically.

Let's take a look at the imaging options for PCS
# Pelvic Congestion: Menu of Radiologic Tests

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<th>Key Findings</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<td>Ultrasound</td>
<td>- Dilated ovarian veins</td>
<td>- Non invasive</td>
<td>- Operator dependent</td>
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<td>- Pelvic varices &gt; 5mm</td>
<td>- Readily available</td>
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<td>- Reversed flow with Doppler</td>
<td>- Can detect other causes of symptoms</td>
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<tr>
<td>Contrast CT / CTA</td>
<td>- Dilated ovarian veins</td>
<td>- Non operator dependent</td>
<td>- Supine position can underestimate size of veins</td>
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<td>- Tortuous pelvic varices</td>
<td>- Can visualize vascular anatomy for possible etiology</td>
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<td>- Contrast exposure</td>
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<tr>
<td>MRI / MRV</td>
<td>- Dilated ovarian veins</td>
<td>- Non invasive</td>
<td>- Expense</td>
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<td>- Pelvic varices often hyperintense on T2</td>
<td>- No contrast</td>
<td>- Patient comfort</td>
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<td>- MRV becoming popular; can image pelvic venous system in 1 breath hold</td>
<td>- Supine position can underestimate size of veins</td>
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<td>- Follow up limited for patients who have had embolization with metal coils</td>
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<td>Direct Venography</td>
<td>- Dilated veins</td>
<td>- Gold standard</td>
<td>- Invasive</td>
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<td>- Reflux</td>
<td>- Can be done @ time of embolization</td>
<td>- Contrast</td>
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Ms. C: Dilated Pelvic Veins on TVUS

- Markedly dilated pelvic veins adjacent to left ovary

Sagittal Transvaginal Ultrasound images of left ovary with and without Doppler
Pelvic Congestion: US Findings

- Both transvaginal and transabdominal ultrasound can be used in evaluation of pelvic congestion syndrome
- Non-invasive, often first-line imaging
- Can identify other causes of pelvic pain

Findings include:
- Dilated ovarian vein > 5 mm
- Tortuous pelvic veins around ovary and uterus > 5 mm
- Dilated arcuate veins crossing uterine myometrium
- Slow or reversed (caudal) flow with Doppler
- Changes with Valsalva
  - Increase in size of varices
  - Variable duplex waveform
Ms. C: Dilation of Pelvic Veins on TVUS before Valsalva

Pre-Valsalva
Dilated pelvic vein
Diameter = 8.4 mm
Ms. C: Dilation of Pelvic Veins on TVUS with Valsalva

Post-Valsalva
Dilated pelvic vein
Diameter = 8.8 mm
Anatomy Review: Gonadal Veins

- **Right ovarian vein drains into IVC**
- **Left ovarian vein drains into left renal vein**
- **Left renal vein courses anteriorly to aorta**

Volume-rendered MDCT image of left and right ovarian veins. From Karaosmanoglu et. al. “MDCT of the Ovarian Vein: Normal Anatomy and Pathology.” AJR 192: January 2009
Ms. C: Dilated Ovarian Vein on MRI

- Dilated left ovarian vein measuring 9 mm
- Prominent adnexal veins
Pelvic Congestion: MRI Findings

- Multi-planar imaging allows good visualization of pelvic anatomy and vasculature

- Appearance of varices:
  - Flow voids on T1
  - Can be hypo-intense, iso-intense or hyper-intense on T2 depending on velocity of blood flow
  - High signal intensity on gradient echo

- Time of flight sequences can assess direction of blood flow
  - Technique that optimizes signal from flowing blood and diminishes signal from stationary tissue
Ms. C: Retrograde Flow in Left Ovarian Vein on Time-of-Flight MRI

- Time-of-Flight demonstrates reversed flow in left ovarian vein
  - left ovarian vein has flow in the same direction as aorta
  - No flow seen in image selected for venous flow
Ms. C: Clinical Course

- Given the imaging findings, pelvic congestion syndrome was thought to be the etiology of Ms. C’s pelvic pain.

- She elected to undergo pelvic vein embolization.
Pelvic Vein Embolization

- **Overview**
  - Transcatheter embolization using coils and/or sclerosing agents to occlude ovarian vein
  - Venograms performed during procedure to verify anatomy and assess extent of collaterals
    - Collaterals between ovarian and internal iliac venous plexus may cause recurrence of symptoms
  - Can perform balloon embolization of internal iliac veins to visualize collaterals

- **Effectiveness**
  - Studies have demonstrated symptomatic relief in 70-80% of patients
  - Long-term effects not well characterized
    - Recent study by Kim et. al
      - 127 patients with pelvic congestion syndrome who underwent embolization
      - 83% reported clinical improvement at 4-year follow up

- **Risks**
  - Ovarian vein thrombophlebitis, recurrence of varices, radiation exposure, migration of embolic material

- **Areas of debate**
  - Unilateral vs. bilateral embolization
  - Internal iliac embolization
Ms. C: Ovarian Venogram During Embolization

Tip of catheter in left ovarian vein showing RETROGRADE flow toward ovary

Dilated and tortuous left ovarian vein and collaterals

Congestion of veins in pelvis
Ms. C: Left Ovarian Vein Coiling

Fluoroscopy image of left ovarian vein embolization

Amplatzer vascular occlusion device within left ovarian vein

www.amplatzer.com
Ms. C: Post-Embolization Venogram

Pre-embolization left ovarian venogram

Post-embolization left ovarian venogram

Ms. C reported significant pain relief at her two-week follow up visit
Ms. C’s case demonstrated pelvic vein congestion without an identified anatomic etiology.

Let’s move on to see features of pelvic congestion secondary to anatomic anomalies in two companion patients.
Companion Patient #1: Dilated Ovarian Vein and Pelvic Varices on CT

- 42 year old G2P2 with six months of left lower quadrant pain and a normal ultrasound
Companion Patient #1: Left Renal Vein Compression on CT

Left renal vein compressed between aorta and SMA
Nutcracker Syndrome: Overview

- **Left renal vein (LRV) entrapment syndrome**

- **Etiologies**
  - LRV compressed between aorta and SMV
    - “anterior” nutcracker phenomenon
  - Retro-aortic LRV compressed between aorta and spinal cord
    - “posterior” nutcracker phenomenon
  - Circum-aortic LRV

- **Clinical consequences**
  - Increased pressure between LRV and IVC
    - Can cause rupture of small veins into collecting system
      - Hematuria
      - Flank pain
    - Venous obstruction and symptoms of pelvic congestion syndrome

- **Treatment options**
  - Surgery
  - Stents
    - Can cause fibromuscular dysplasia
  - Embolization
Companion Patient #2:
Pelvic Congestion due to Retro-aortic Left Renal Vein

Axial MIP CT images
Companion Patient #1 underwent ovarian vein embolization. Let’s take a look at the images from her procedure.
Companion #1: Left Ovarian Venogram Pre- and Post-Embolization

Pre-embolization ovarian venogram

Post-embolization ovarian venogram

Coils Occluded left ovarian vein

BIDMC PACS Fluoroscopy prior to ovarian vein embolization

BIDMC PACS Fluoroscopy post to ovarian vein embolization
Companion Patient #1: Clinical Course

- Companion Patient #1 continued to have pain after her embolization procedure. One possible explanation for her residual pain is the presence of large collateral pelvic varices.

- She did not undergo internal iliac vein balloon occlusion during her procedure.

*Let’s move on to see how internal iliac balloon occlusion can identify additional varices in a companion patient.*
When there is reflux in the ovarian vein, collateral vessels can form that drain into the iliac vein.

Companion Patient #3: Dilated Ovarian Varices on Venogram

- 38 year old multiparous woman with symptoms of pelvic congestion syndrome
- Bilateral ovarian venograms demonstrate dilated ovarian varices and some reflux across midline

Left ovarian venogram

Right ovarian venogram

Courtesy Dr. Tim Killoran

Left ovarian venogram: DSA

Right ovarian venogram: DSA

Coiled left ovarian vein
Companion Patient #3: Bilateral Ovarian Vein Coiling

Left and right ovarian veins embolized with platinum coils

Courtesy Dr. Tim Killoran
Fluoroscopy, bilateral ovarian veins
Companion Patient #3: Right Internal Iliac Vein Balloon Occlusion

- Balloon occlusion of internal iliac vein prevents flow out of varices that drain into iliac vein.
- Allows visualization of additional collaterals that may cause recurrent symptoms.
- No significant varices identified on right internal iliac occlusion.

*Courtesy Dr. Tim Killoran*

Right internal iliac balloon occlusion venography; DSA
Companion Patient #3: Left Internal Iliac Vein Balloon Occlusion

multiple pelvic varices

Courtesy Dr. Tim Killoran

*Left internal iliac balloon occlusion pre-embolization venography, DSA*
Companion Patient #3: Clinical Course

- Companion Patient #3’s left internal iliac balloon occlusion demonstrated significant pelvic collaterals.

- She underwent left internal iliac embolization to treat these varices
Companion Patient #3:
Venogram After Left Internal Iliac Embolization

Significant decrease in size of varices

Courtesy Dr. Tim Killoran

Left internal iliac balloon occlusion post-embolization venography, DSA
Pelvic congestion syndrome is a potentially overlooked cause of chronic pelvic pain.

Radiologic diagnosis:
- Ultrasound, MRI/MRV and CT can demonstrate dilated ovarian veins and pelvic varices.
- Venography is the gold standard.

Ovarian vein embolization is an effective and promising therapy for this condition.
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References


