

# RADY 401 Case Presentation

Cy Fogleman, MS4  
July 2023

# Focused Patient History and Workup

- Ms. L is a 34 yo F with PMHx of anxiety, migraines and a recent uncomplicated childbirth 6 months ago.
- Presents with 9 days of worsening nausea and large volume bilious vomiting several times a day, inability to take PO, constipation, dizziness and a 45 lb weight loss since giving birth.
- Notably had been to the hospital 4 days ago and given IV fluids and anti-emetics for presumed cyclic vomiting syndrome and dehydration.

## Vitals:

BP 94/68 Pulse 88 bpm      RR 16      SPO2 98% RA      Afebrile

## Labs:

HypoNa: 126    HypoK: 2.1    Creatinine 2.1    Anion Gap: 17

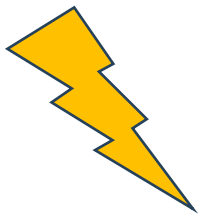
Pregnancy Test: Negative    EKG: NSR with prolonged QTc at 525

Interpretation: This patient is hypovolemic and experiencing electrolyte abnormalities that are impacting her QTc and causing dizziness as a result of continuous vomiting and inability to maintain PO intake.

# List of Imaging Studies

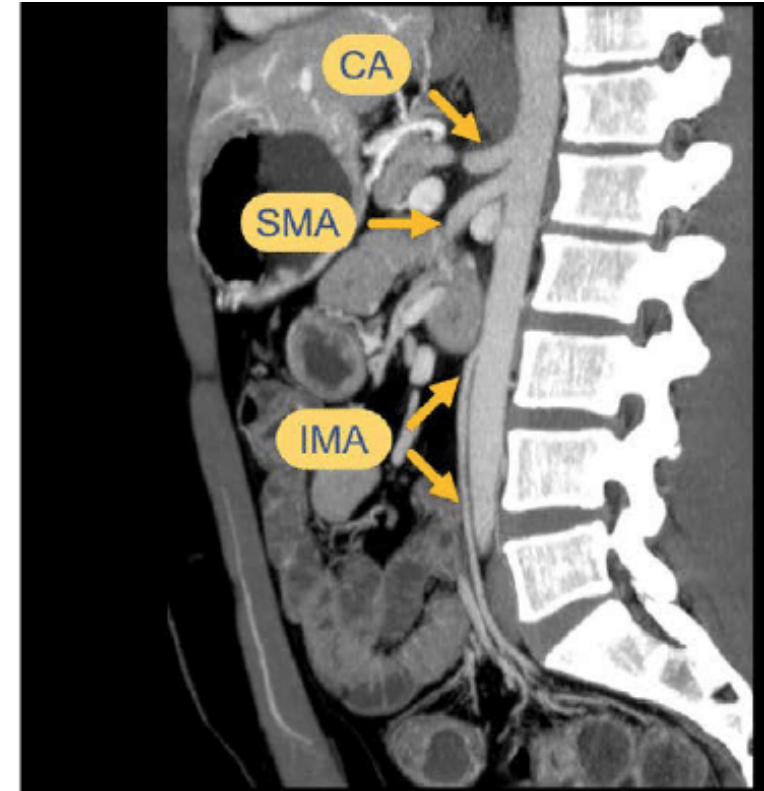
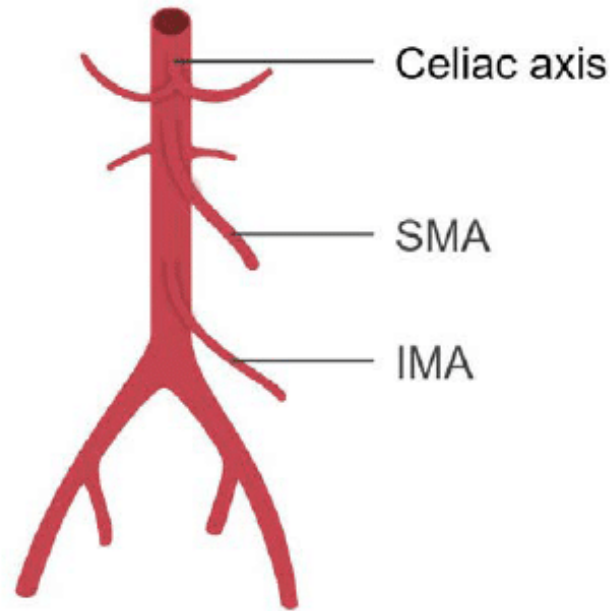
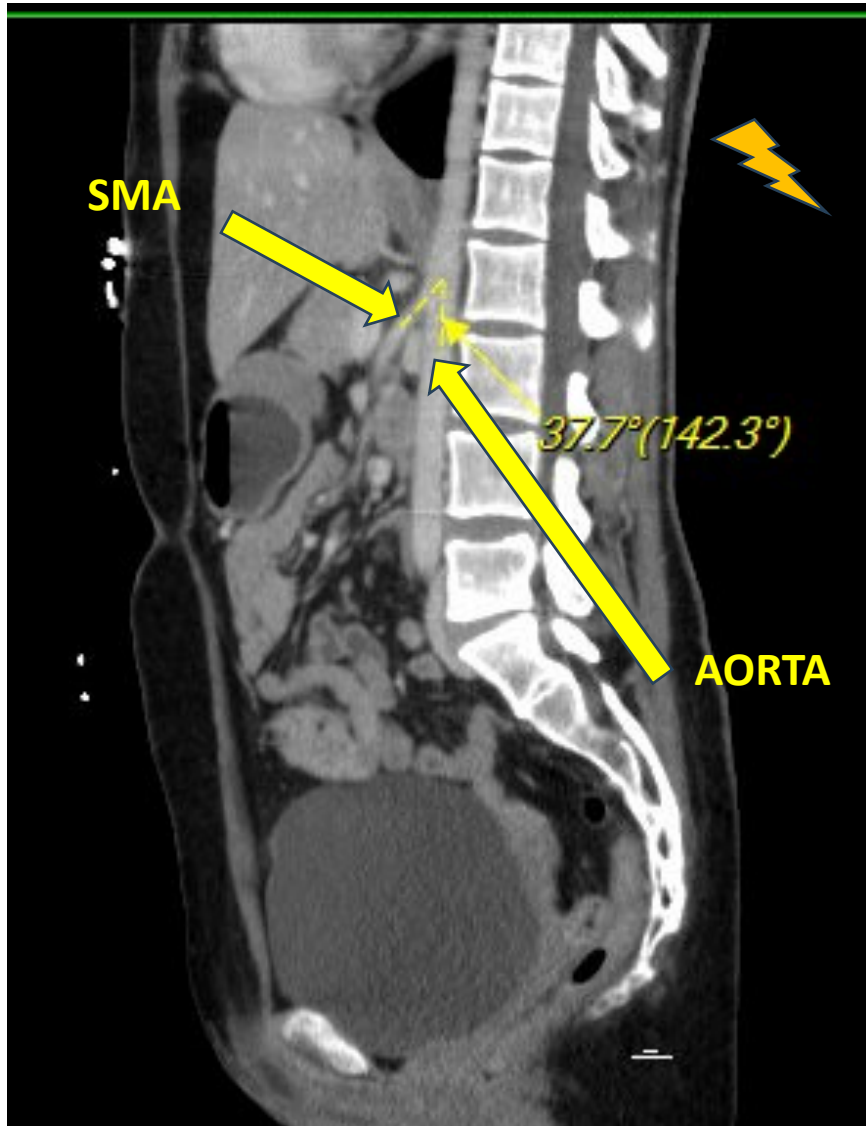
## Obtained:

- CT A/P with contrast initially
- Ultimately obtained Upper GI Fluoroscopy Single Contrast



= Patient Image

# CT Abdomen Pelvis With Contrast: Sagittal

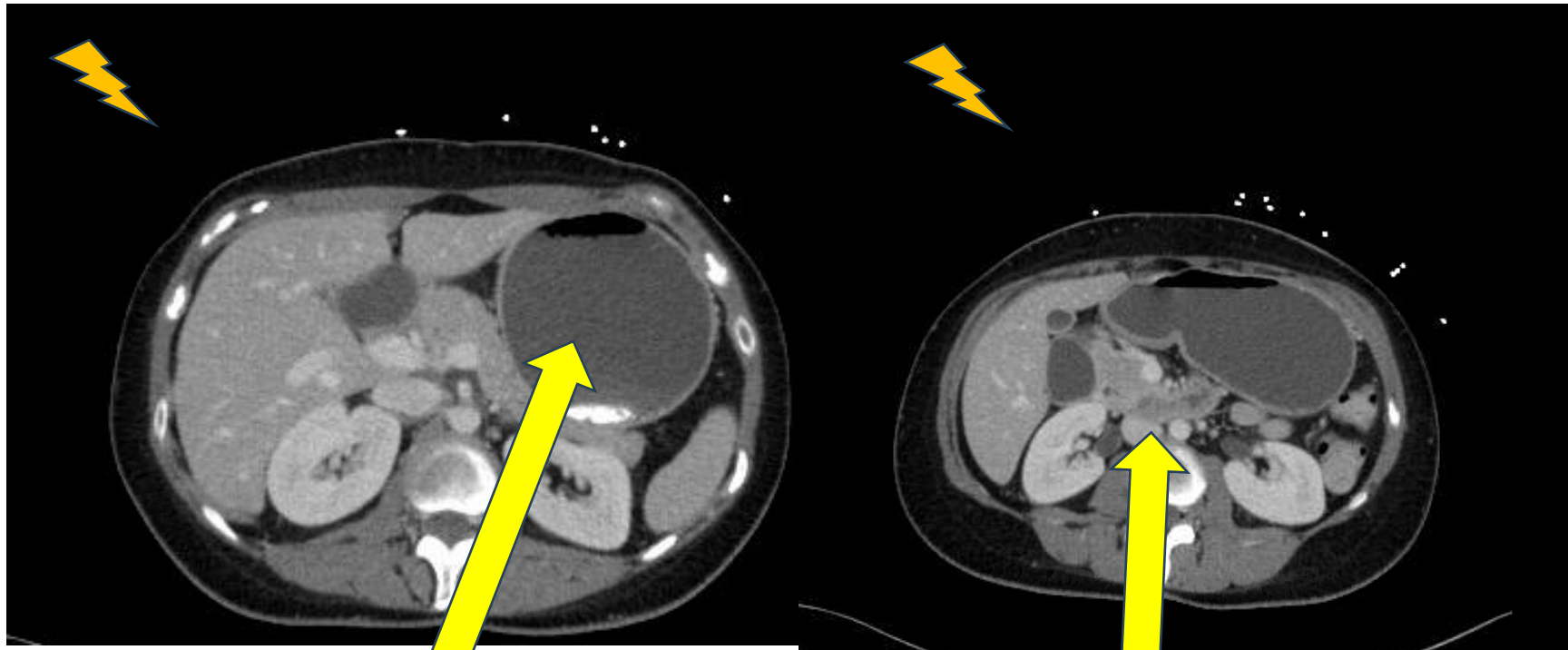


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In SMA Syndrome, specific attention is paid to the aortomesenteric angle.

In this scan, the aortomesenteric angle is reported to be normal at 37.7 degrees.

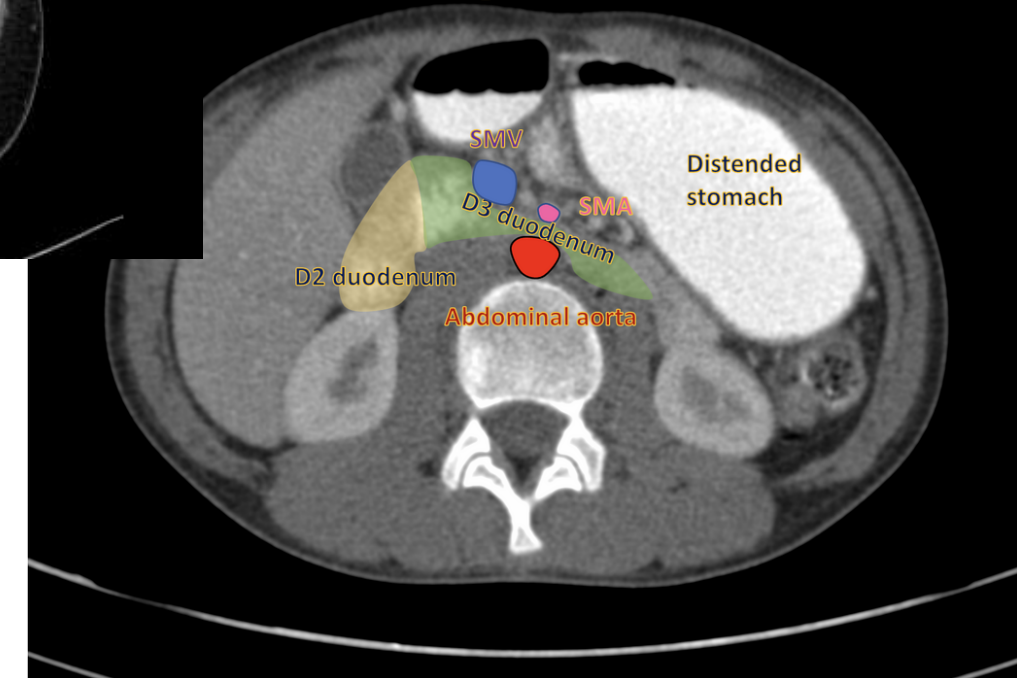
# CT Abdomen Pelvis With Contrast: Axial



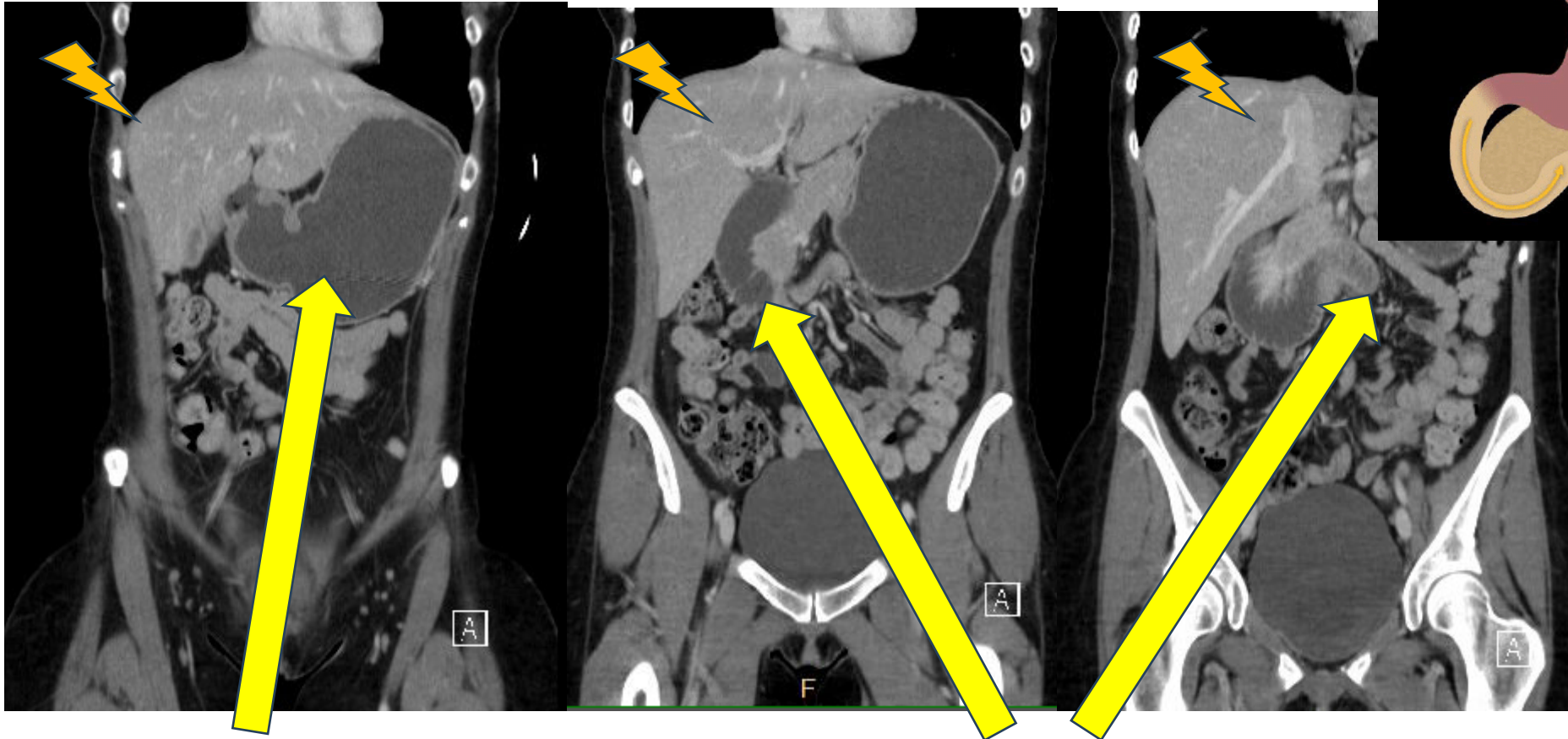
Stomach is  
distended  
with ingested  
debris.

The duodenum is  
dilated.

## SMA Syndrome

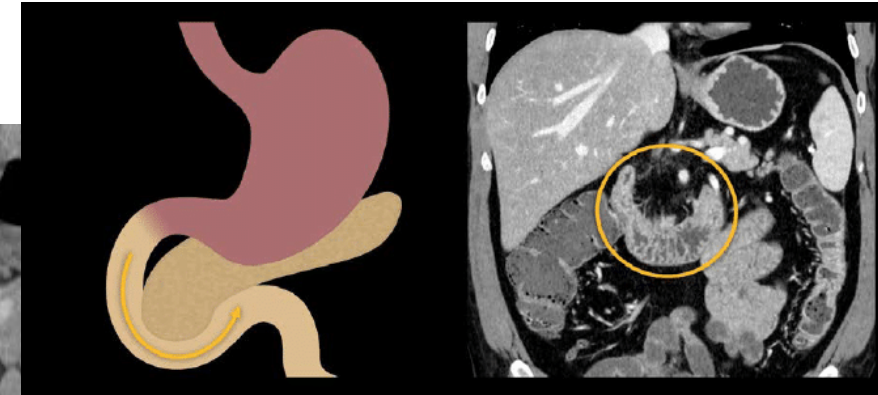


# CT Abdomen Pelvis With Contrast: Coronal



Stomach is distended.

Dilation of the duodenum with tapering once it passes the SMA.

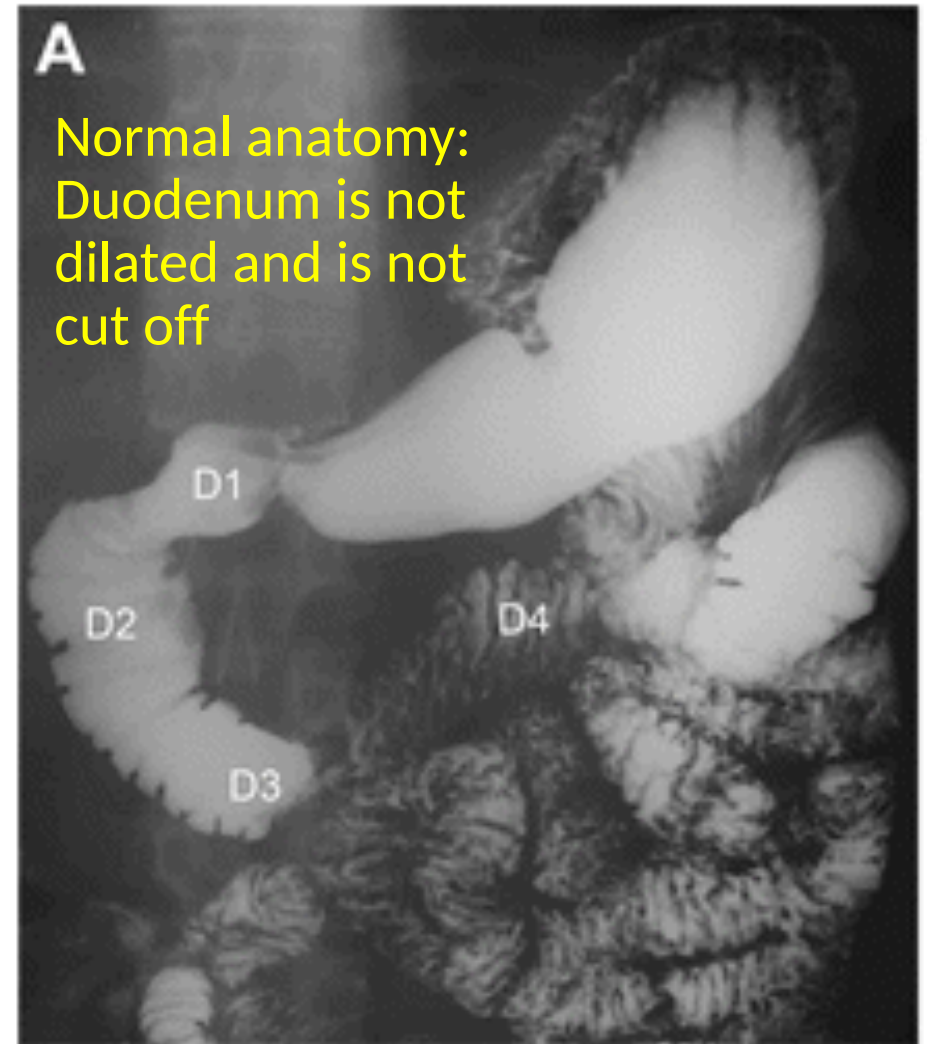
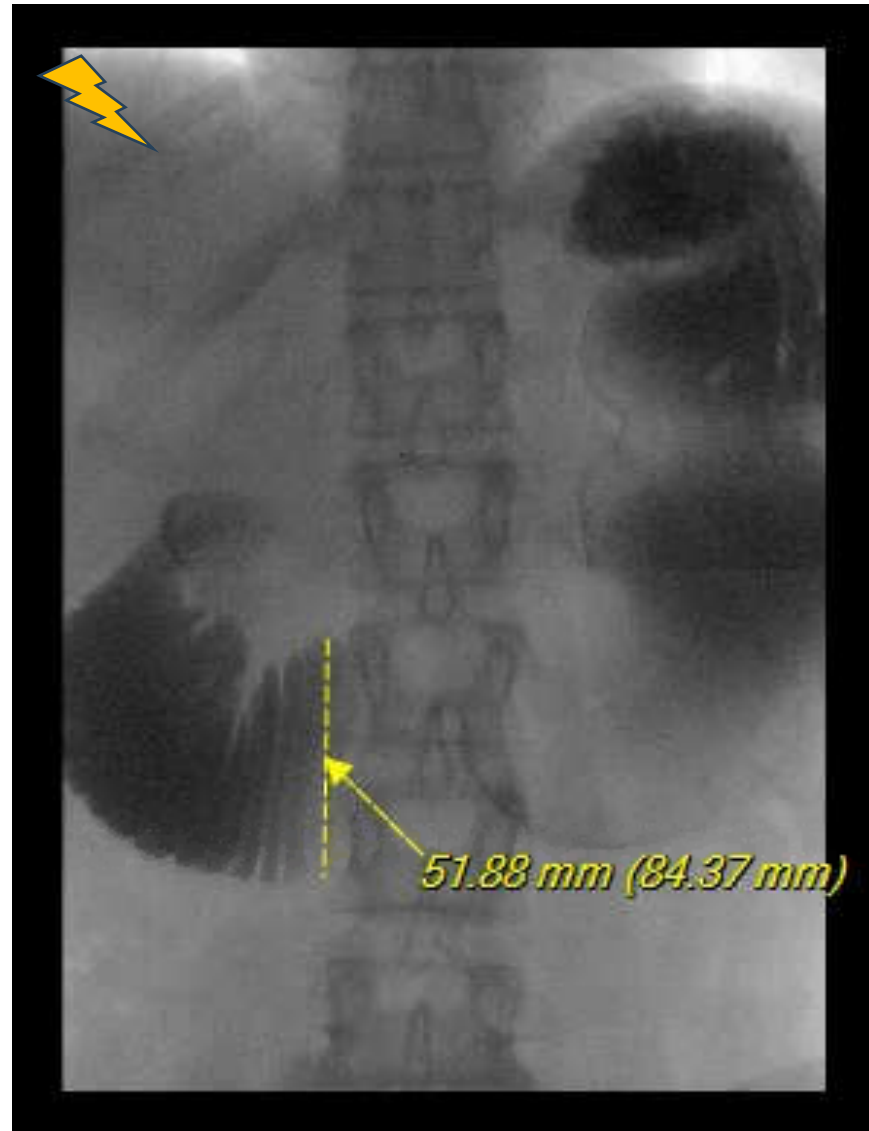


In normal anatomy, you should not see tapering or distension/dilation of the duodenum.



# Upper GI Fluoroscopy Single Contrast: Coronal

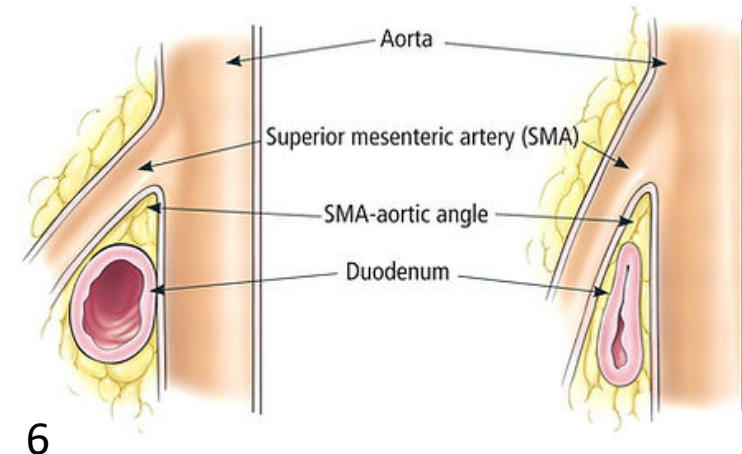
Duodenum  
is dilated  
and  
abruptly  
cuts off  
around the  
location of  
the SMA



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# SMA (Superior Mesenteric Artery) Syndrome<sup>5</sup>

- Duodenum is compressed between the aorta and SMA.
- Fat pad decreases in size which decreases the angle between SMA and Aorta.
  - Decreases from rapid weight loss such as in trauma, burns, malabsorption, AIDS, cancer, anorexia or can be hereditary from certain anatomical abnormalities.
- Continued weight loss in the setting of decreased oral intake and bowel obstruction causes progression of this syndrome
- Very rare: estimated 0.1-0.3% incidence
  - But very serious because it is not diagnosed and treated, it can result in severe electrolyte abnormalities and death.
- This patient's presentation represents SMA Syndrome as it is a clinical diagnosis supported by imaging
  - *For this patient, the thought is the ~45 lb loss after pregnancy plus anatomic susceptibility led to this SMA Syndrome presentation*



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# Patient Treatment & Outcome

- Electrolytes and fluids repleted.
- Nutrition initiated.
  - Initially not tolerated, but eventually began to tolerate PO in small amounts.
- Constipation ruled out via enemas and laxatives producing non-impressive BM.
- Patient expressed desire to return home once able to take smaller amounts of PO with close follow-up.
  - Not classical SMA Syndrome presentation to be able to take PO and go home, but very rare condition so it is unclear if there is just one disease course.
  - However, her imaging and presentation were consistent with SMA Syndrome
- SMA Syndrome is a diagnosis of exclusion, so patient is still undergoing additional outpatient work-up (including autoimmune) and is being followed closely by GI Surgery and GI.

# Typical Treatments<sup>5</sup>

## Conservative first:

1. Optimize electrolytes and fluids
2. Early nutrition to increase fat pad size
3. Decompress if necessary
4. Left lateral decubitus position to help decrease symptoms of compression

## Surgical second:

1. Multiple possible procedures

# Imaging Discussion

*Standard Work—Up Imaging for SMA Syndrome:*

1. CT Scan: Aortomesenteric angle and distance, evaluation of organs
2. Barium Studies: organ evaluation
3. X-ray: obstructive signs

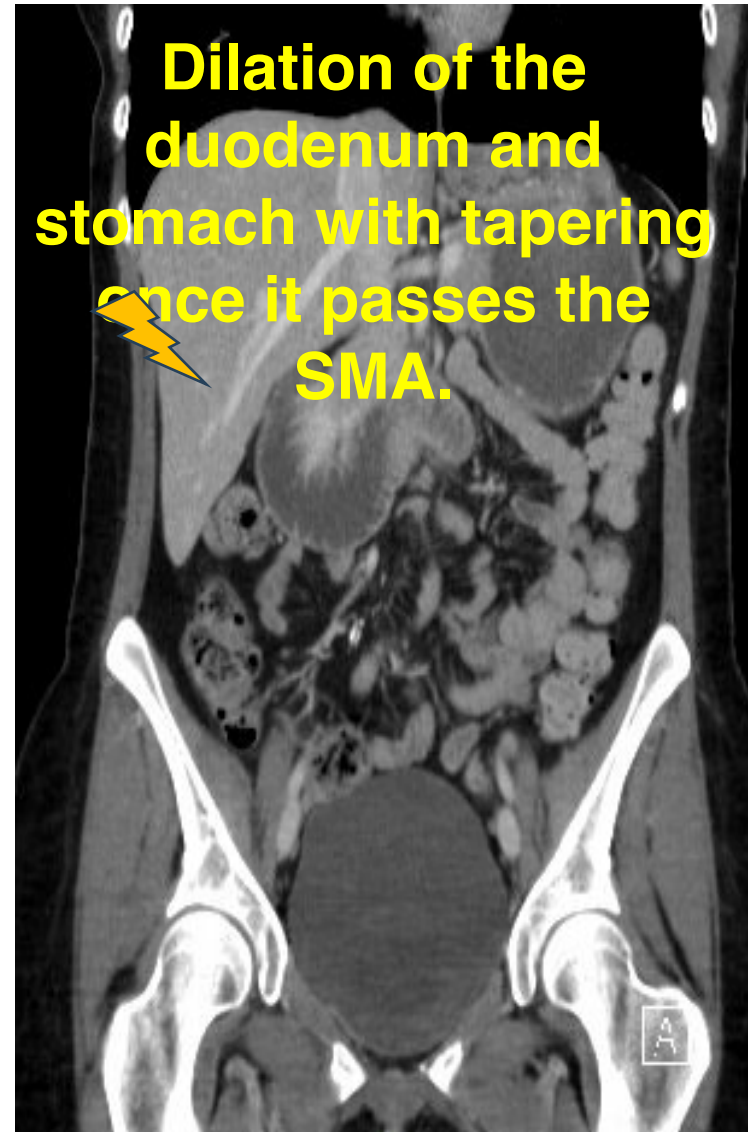
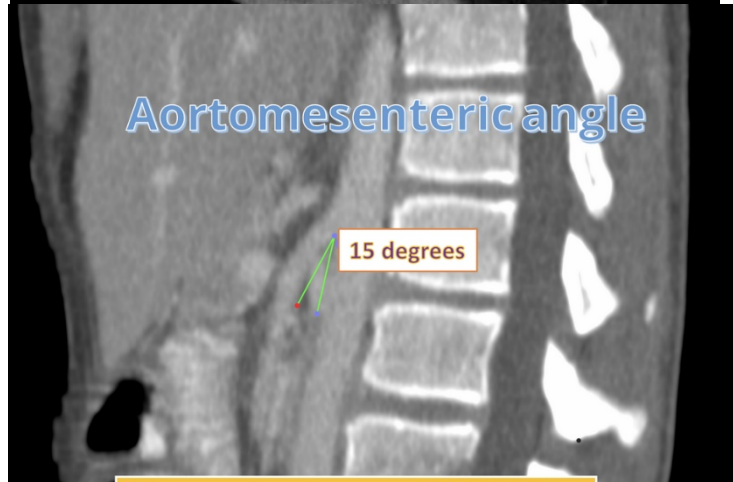
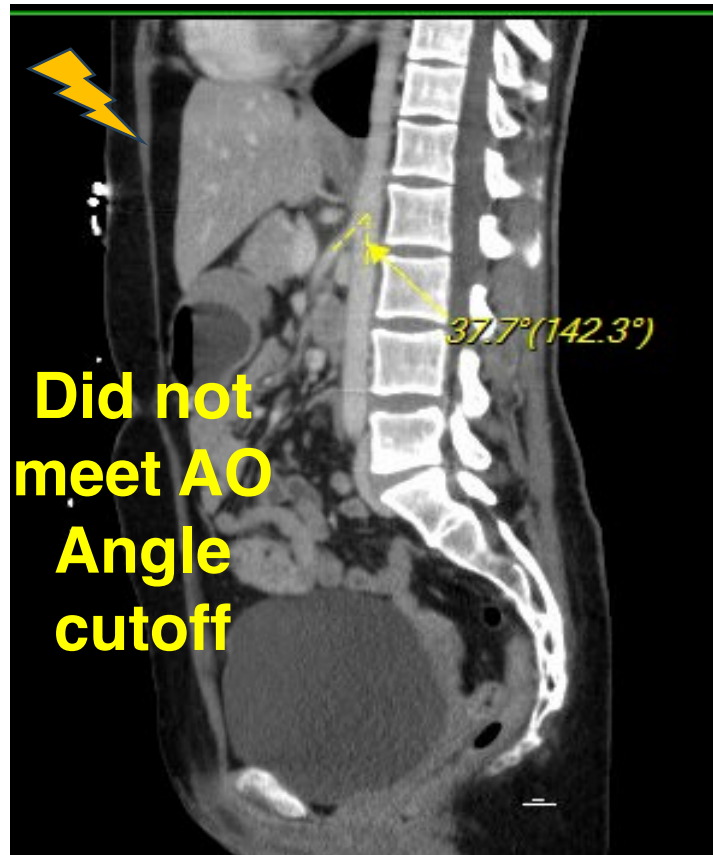
*This patient received all appropriate imaging*

# Imaging Discussion

## Imaging Diagnostic Criteria:

1. Symptoms of obstruction plus imaging findings indicating obstruction (dilation of stomach/duodenum, cut off at level of obstruction)
2. CT: Aortomesenteric Angle <22-25 degrees and Aortomesenteric Distance 8 mm, dilation of the duodenum and compression of the duodenum at the level of SMA
3. Upper GI Series: Haynes Criteria (Dilation of duodenum prior to obstruction, abrupt cutoff at third part of duodenum, no peristaltic flow of contrast prior to obstruction, delay in transit by 4-6 hours and relief of obstruction when knees are brought to the chest).

## Discussion<sup>5</sup>



# Discussion<sup>5,9,10,11</sup>

## Sensitivity: Rule out ~ Screening

- CT Scan AO Angle 22 degrees or less is 42.8% (*Not best at ruling out*)
- CT Scan AO Distance 8 mm or less is 100%

## Specificity: Rule in ~ Confirmatory

- CT Scan AO Angle 22 degrees or less is 100%
- CT Scan AO Distance 8 mm or less is 100%

## Costs:

- CT A/P with Contrast:
  - \$6,886.00 (charge to insurance based on UNC procedure cost site)
  - Pay anywhere from \$300-\$3000 based on insurance
- Upper GI:
  - \$610-\$3278 range with \$1814 average

## Radiation Doses:

- CT A/P: 7.7 mSv
- Upper GI Study: 6 mSv



# UNC Top Three

1. Symptoms of obstruction requires urgent imaging to confirm radiologic evidence of obstruction because obstruction can be deadly.
2. CT Scan is an excellent choice to assess whether SMA Syndrome may be present via the Aortomesenteric Angle and Distance.
3. SMA Syndrome is an incredibly rare and potentially deadly condition that requires immediate recognition, management and an in-depth work-up as it is a diagnosis of exclusion.

# References

1. Hartung, Michael P, and Mike Cadogan. "Abdominal CT: Abdominal Arteries." *Life in the Fast Lane • LITFL*, 8 May 2023, litfl.com/abdominal-ct-vessels/.
2. Guan H, Superior mesenteric artery syndrome. Case study, Radiopaedia.org (Accessed on 01 Jul 2023) <https://doi.org/10.53347/rID-154928>
3. Hartung, Michael P, and Mike Cadogan. "Abdominal CT: Small Intestine." *Life in the Fast Lane • LITFL*, 8 May 2023, litfl.com/abdominal-ct-small-intestine/.
4. Johnson LN, Moran SK, Bhargava P, et al. Fluoroscopic Evaluation of Duodenal Diseases. *RadioGraphics*. 2022;42(2):397-416. doi:10.1148/rg.210165
5. Van Horne N, Jackson JP. Superior Mesenteric Artery Syndrome. [Updated 2022 Jul 18]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482209/>
6. *SMASRAS*, n.d. Superior Mesenteric Artery Syndrome Research Awareness and Support. [www.smasynndrome.org/](http://www.smasynndrome.org/). "What Is SMAS?" Accessed 1 July 2023.
7. Reichenbach ZW, Gotfried J. Superior mesenteric artery syndrome. *Consultant*. 2020;60(12):30-32.doi:10.25270/con.2020.09.00008
8. Johnson BM, Paladugu G. Superior Mesenteric Artery Syndrome Secondary to Anorexia Nervosa and Methamphetamine Use. *Cureus*. 2019 Nov 11;11(11):e6121. doi: 10.7759/cureus.6121. PMID: 31886059; PMCID: PMC6903892.
9. "Standard Charges." *UNC Health Standard Charges & Shoppable Services Information*, 3 Jan. 2023, [www.unchealth.org/records-insurance/standard-charges](http://www.unchealth.org/records-insurance/standard-charges).
10. "Radiation Dose." *Radiologyinfo.Org*, American College of Radiology, Radiological Society of North America, 1 Nov. 2022, [www.radiologyinfo.org/en/info/safety-xray](http://www.radiologyinfo.org/en/info/safety-xray). Accessed 01 July 2023.
11. ClinicPriceCheck. "X-Ray Upper GI Series, with Small Bowel Films." *Clinic Price Check*, [www.clinicpricecheck.com/services/6612/x-ray-upper-gi-series-with-small-bowel-films](http://www.clinicpricecheck.com/services/6612/x-ray-upper-gi-series-with-small-bowel-films). Accessed 17 July 2023.