

# RADY 403 Case Presentation

Alexander McKenzie MS4  
June 2018

Ed. John Lilly, MD

# Focused patient history and workup

- 30 yo F G<sub>4</sub>P<sub>2</sub>01<sub>2</sub> at 37w admitted for induction of labor after fetal anatomy scan at 36w found dilated stomach and proximal bowel as well as fetal growth restriction
- Delivery via cesarean section for recurrent late decelerations. Birth was notable for meconium stained amniotic fluid, breech presentation, and double nuchal cord
  - Apgar scores: 3 & 8. Brief resuscitation in OR but transferred to NICU breathing spontaneously on RA

# List of imaging studies

- Fetal transabdominal ultrasound at 36w5d
- Portable AP abdominal radiograph
- Upper GI fluoroscopy
- Renal ultrasound (normal)
- Transthoracic echocardiogram (normal)

# Transabdominal Fetal Ultrasound 36w5d

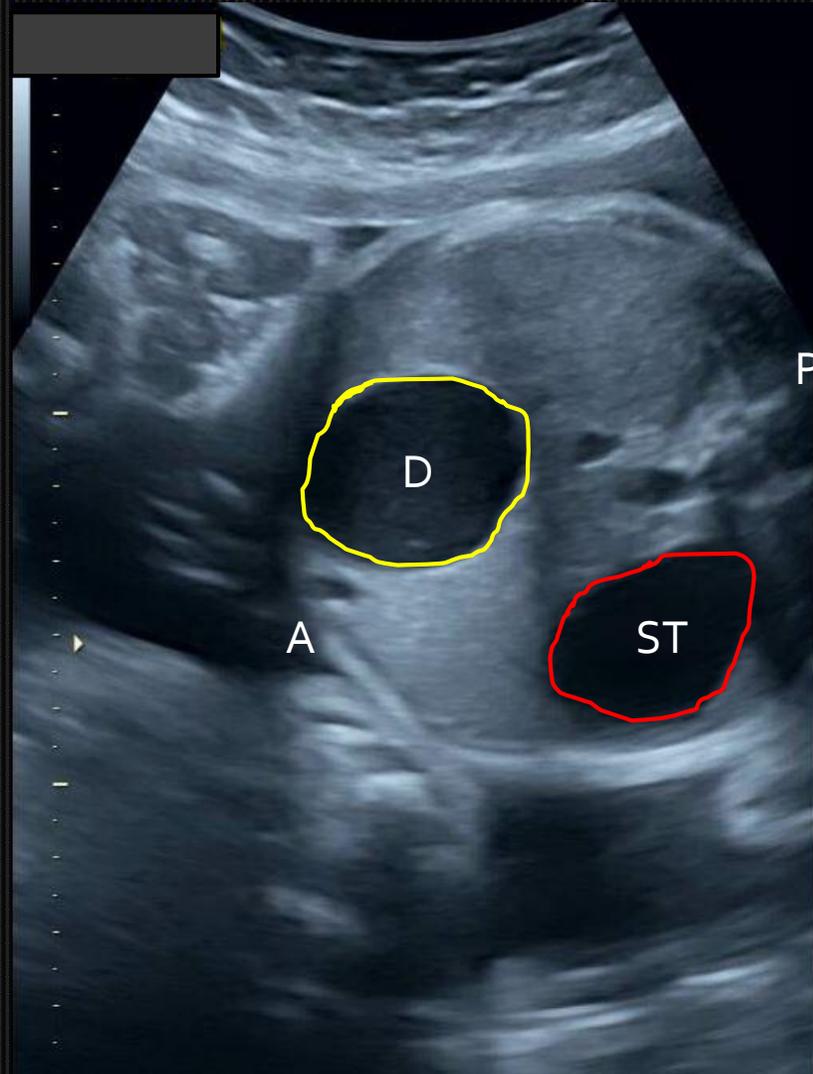
Findings?



\*Transverse view  
of fetal abdomen

# Transabdominal Fetal Ultrasound 36w5d

Large hypoechoic cystic areas seen on transverse view of fetal abdomen are consistent with dilated fetal **stomach** and **small bowel**. This “double bubble” sign is classic for proximal small bowel/duodenal obstruction secondary to duodenal atresia but may also be seen in other cases of duodenal obstruction.

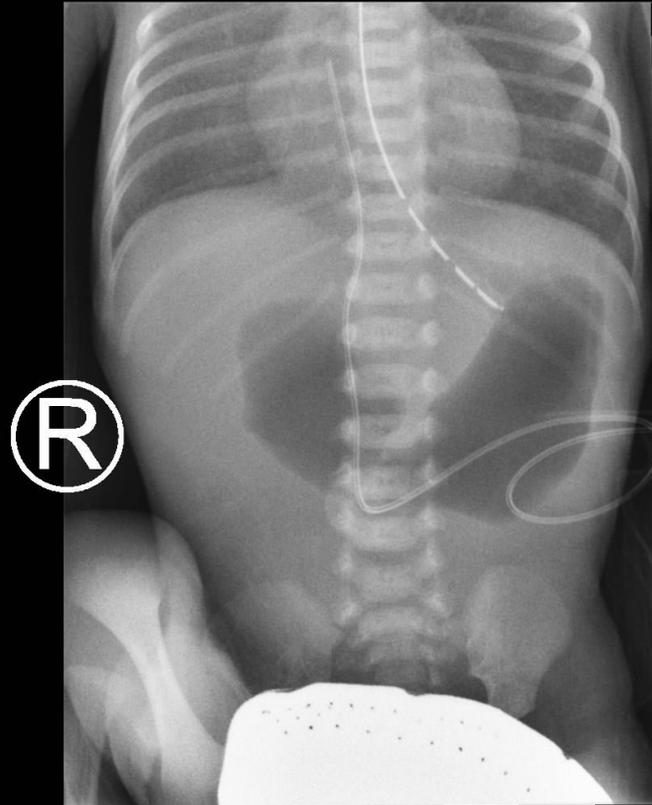


# DOL #1 AP Portable Abdominal Radiograph

Findings?

PORTABLE  
AP

SUPINE



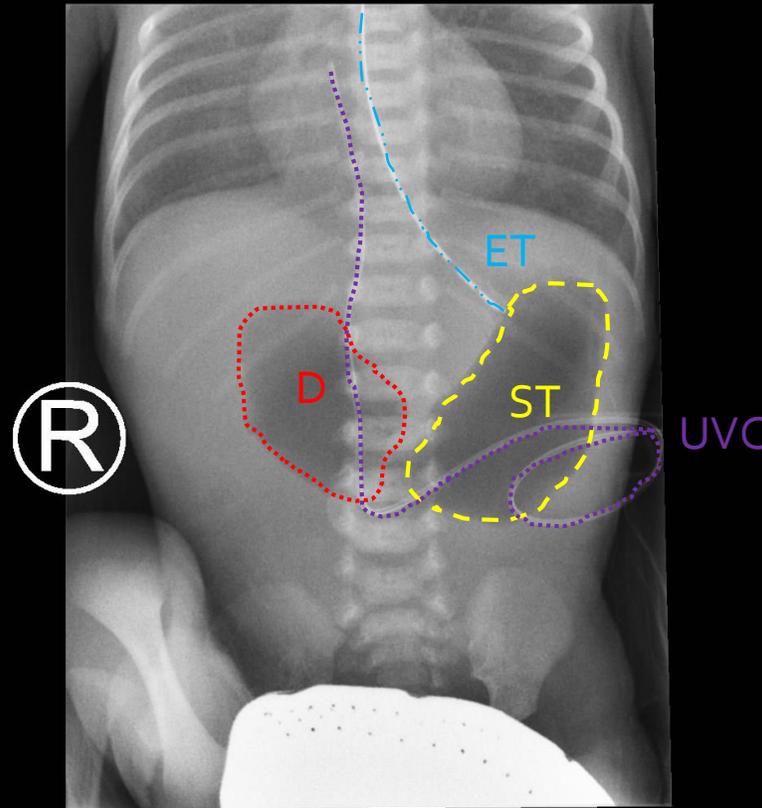
\*KUB obtained on  
day of life one

# DOL #1 AP Portable Abdominal Radiograph

Findings: Enteric tube tip at the gastroesophageal junction. Umbilical venous catheter is in the high right atrium. Gaseous distention of gastric lumen and duodenal bulb is seen along with absence of distal bowel gas. The latter findings are consistent with duodenal atresia.

PORTABLE  
AP

SUPINE



# Patient treatment

- Stomach and duodenal bulb decompressed with enteric tube prior to surgery
- Patient was taken to OR on DOL #3 where complete duodenal atresia was confirmed and surgical repair was performed. Repair was difficult due to lack of proximal duodenal tissue that required stretching of stomach for anastomosis, increasing the risk of anastomotic leak
- Patient remained on TPN until POD#15 when tube feeds were initiated after patency was confirmed with upper GI fluoroscopy study

# POD #5 Upper GI Fluoro Study with KUB Single Contrast

Findings?

\*Supine abdominal radiograph with contrast

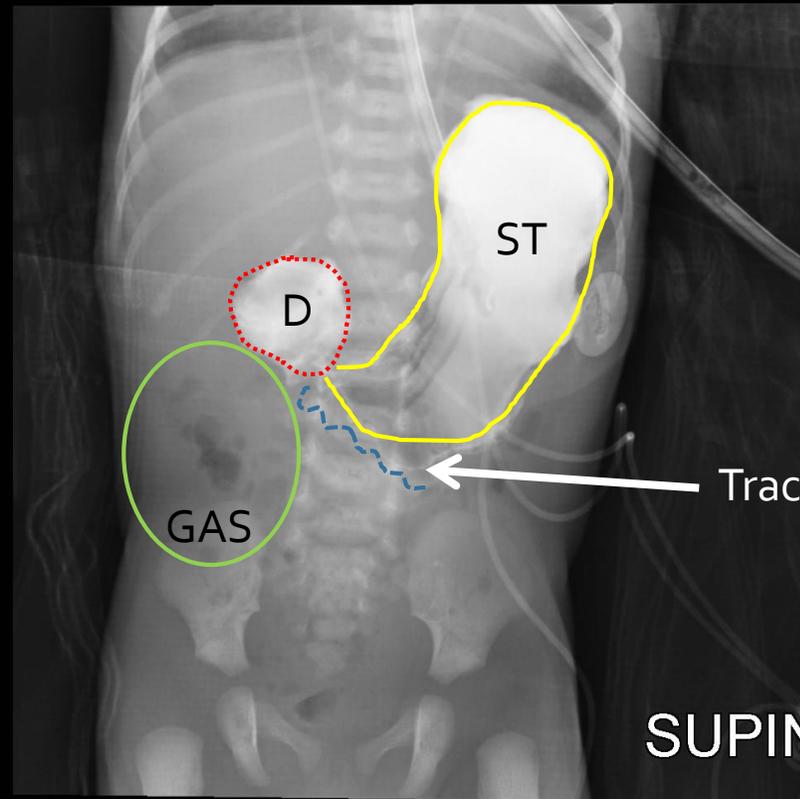


SUPINE

IMMEDIATE

# POD #5 Upper GI Fluoro Study with KUB Single Contrast

Findings: The **stomach** and **proximal duodenum** remain moderately distended but trace amounts of contrast were visualized in the **distal duodenum**. There is distal **bowel gas** present which was not visualized on the KUB from DOL#1. No evidence of anastomotic leak.



Trace contrast in distal duodenum

SUPINE

IMMEDIATE

# POD #15 Upper GI Fluoro Study with KUB Single Contrast

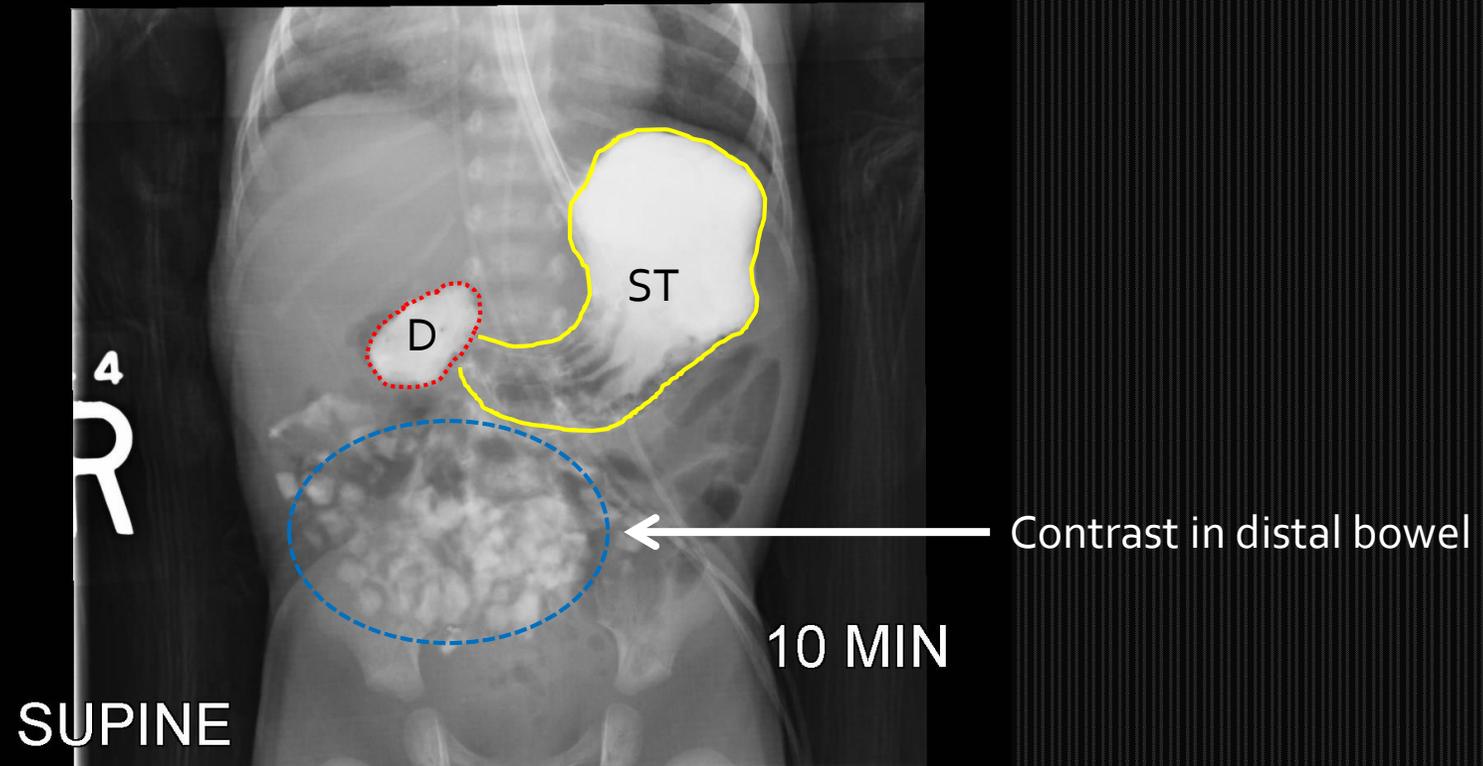
Findings?

\*Supine abdominal radiograph with contrast



# POD #15 Upper GI Fluoro Study with KUB Single Contrast

Findings: Persistent distension of the **stomach** and **proximal duodenum** but improved from prior study on POD#5. Contrast is now clearly visualized in the distal bowel with no evidence of anastomotic leak.



# Discussion: Duodenal Atresia

- Duodenal atresia is complete occlusion of the intestinal tract that is thought to result from failure of bowel recanalization at 8-10 weeks gestation.<sup>1</sup>
- Diagnosis is commonly made in the third trimester when the stomach and proximal duodenum are dilated, displaying the classic “double bubble” sign on prenatal ultrasound.<sup>1</sup>
- Differential diagnosis of a “double bubble” includes annular pancreas, intestinal malrotation, gastrointestinal duplication cysts, preduodenal portal vein, and choledochal cyst.<sup>1</sup>

# Discussion: Prenatal Imaging of Duodenal Atresia

- A standard fetal anatomy ultrasound in the 2<sup>nd</sup> or 3<sup>rd</sup> trimester includes an evaluation of the stomach. Observation of two fluid-filled structures in the upper abdomen is the key abnormality that should prompt consideration of duodenal atresia.<sup>1</sup>



# Discussion: Postnatal Imaging of Duodenal Atresia

- Commonly infants with duodenal atresia will present with abdominal distension and emesis that is often bilious.<sup>3</sup>
- Affected infants may pass meconium in 10-20% of cases.<sup>3</sup>

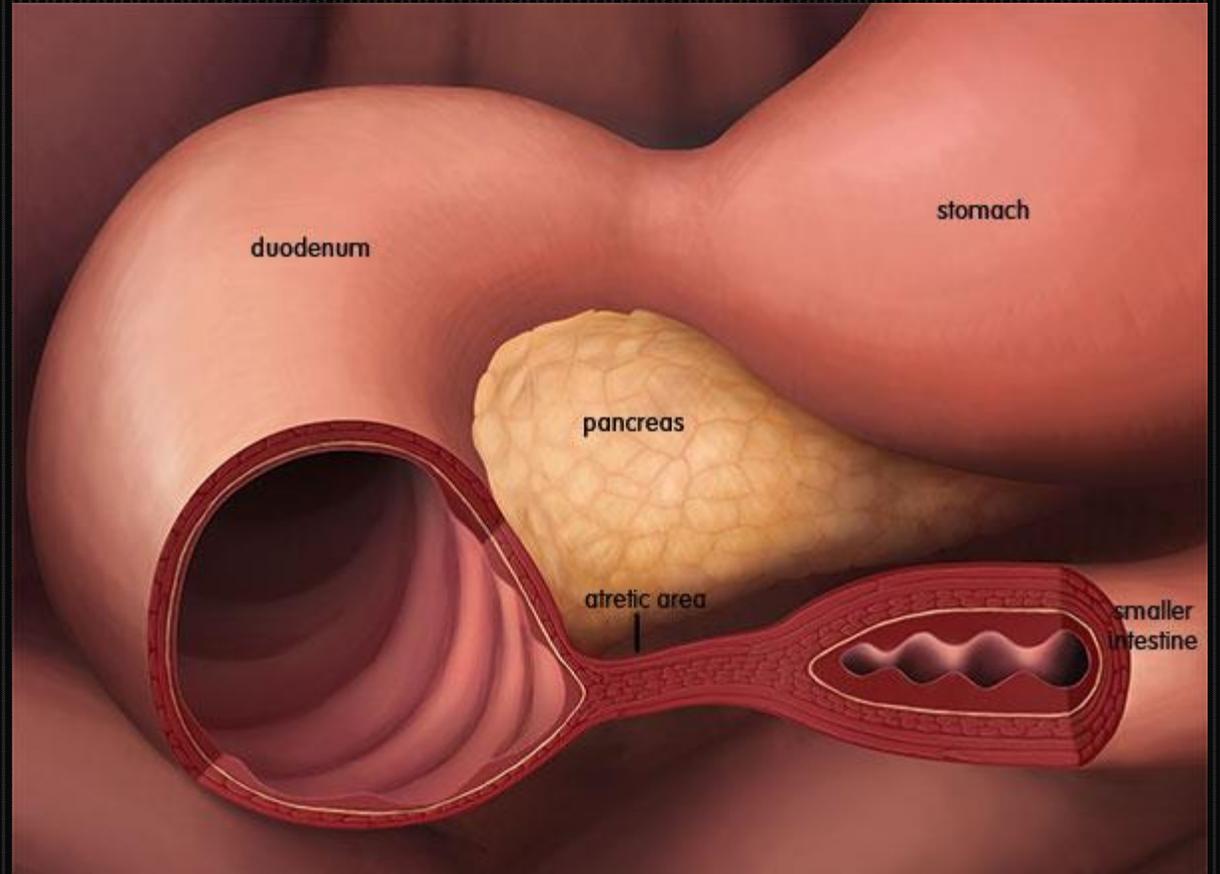


Illustration from Children's Mercy Kansas City<sup>4</sup>

# Postnatal Imaging of Duodenal Atresia: What to order first?

Date of origin: 1995  
Last review date: 2014

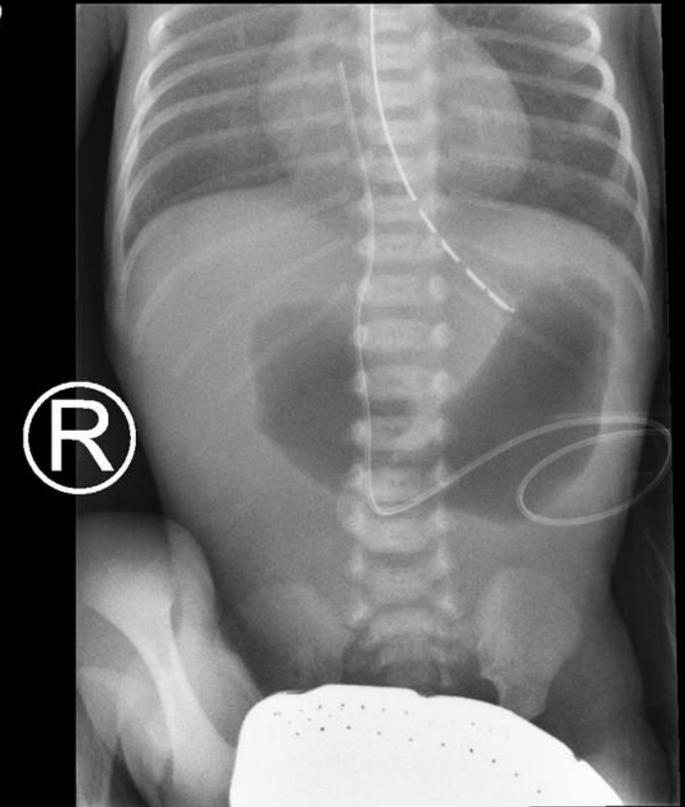
## American College of Radiology ACR Appropriateness Criteria®

**Clinical Condition:** Vomiting in Infants Up to 3 Months of Age

**Variant 1:** Bilious vomiting in neonate up to 1 week old.

Radiologic Procedure	Rating	Comments	RRL*
X-ray abdomen <b>#1</b>	9	An initial radiograph will help determine further workup strategy.	☢☢
X-ray upper GI series	8		☢☢☢
X-ray contrast enema	7	Consider this procedure when abdominal radiograph suggests distal bowel obstruction.	☢☢☢☢
US abdomen (UGI tract)	4		O
<b>Rating Scale:</b> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

AP



# Cost & Radiation Dose

Study	Cost*	Effective Dose of Radiation**
Prenatal Ultrasound	\$109 - \$674	None
Abdominal Radiograph	\$23 - \$380	0.7 mSv
Upper GI Fluoroscopy	\$134 - \$352	1.5 mSv

A literature review in 2016 found that there are no sensitivities/specificities available for the imaging diagnosis of duodenal atresia.<sup>5</sup>

\*Cost estimated using HealthcareBluebook.com<sup>6</sup>

\*\*Average natural background radiation exposure for an individual is 3 mSv per year<sup>7</sup>

# Associations with Duodenal Atresia

- 50% have other associated anomalies.<sup>1</sup>
- Trisomy 21 is the most common occurring in up to 1/3 of patients with duodenal atresia.<sup>1</sup>
- Duodenal atresia can be part of the VACTERL association (vertebral, anal atresia, cardiac, tracheoesophageal fistula, renal, limb).<sup>1</sup>
- 20-30% of fetuses with duodenal atresia have congenital heart disease.<sup>1</sup>
- If you suspect duodenal atresia is the diagnosis based on prenatal imaging then additional imaging studies (i.e. echocardiography) should be performed. MRI may be useful when additional anomalies are suspected but not definitively diagnosed by ultrasound.<sup>1</sup>

# Duodenal Atresia: Summary

- High suspicion for duodenal atresia when prenatal ultrasound displays “double bubble” sign
- High association with other anomalies so additional imaging is usually warranted
- Postnatal presentation usually includes bilious emesis and an abdominal radiograph is the preferred initial imaging study.
- Patency and evaluation for anastomotic leak in the postoperative patient can be assessed with an upper GI study.

# References

1. D. I. Bulas. Prenatal diagnosis of esophageal, gastrointestinal, and anorectal atresia. UpToDate website. <https://www.uptodate.com/contents/prenatal-diagnosis-of-esophageal-gastrointestinal-and-anorectal-atresia>. Updated November 15, 2017. Accessed June 18, 2018.
2. American College of Radiology. ACR Appropriateness Criteria – Vomiting in Infants Up to 3 Months of Age. <https://acsearch.acr.org/docs/69445/Narrative/> Updated 2014. Accessed June 18, 2018.
3. D. E. Wesson. Intestinal atresia. UpToDate website. <https://www.uptodate.com/contents/intestinal-atresia> . Updated May 17, 2018. Accessed June 18, 2018.
4. Duodenal Atresia. Children’s Mercy Kansas City website. [https://www.childrensmercy.org/Clinics\\_and\\_Services/Clinics\\_and\\_Departments/Fetal\\_Health\\_Center/Duodenal\\_Atresia/](https://www.childrensmercy.org/Clinics_and_Services/Clinics_and_Departments/Fetal_Health_Center/Duodenal_Atresia/). Accessed June 20, 2018.
5. A.G. Carroll, R.G. Kavanagh, C. Ni Leidhin, N.M. Cullinan, L.P. Lavelle, D.E. Malone, Comparative Effectiveness of Imaging Modalities for the Diagnosis of Intestinal Obstruction in Neonates and Infants:: A Critically Appraised Topic, Academic Radiology, Volume 23, Issue 5, 2016, Pages 559-568, ISSN 1076-6332, <http://www.sciencedirect.com/science/article/pii/S1076633216000180>
6. Consumer Fair Price Search. Healthcare Bluebook website. <https://www.healthcarebluebook.com/ui/consumerfront>. Accessed June 19, 2018.
7. Radiation Exposure from Medical Exams and Procedures. Health Physics Society, Specialists in Radiation Safety website. [http://hps.org/documents/Medical\\_Exposures\\_Fact\\_Sheet.pdf](http://hps.org/documents/Medical_Exposures_Fact_Sheet.pdf). Updated January 2010. Accessed June 19, 2018.