



Carolyn Rodriguez, HMS III
Gillian Lieberman, MD

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Emphysematous Infections in Diabetics

**Carolyn Rodriguez, Harvard Medical School Year III
Gillian Lieberman, MD**



Overview

- **Emphysematous Cystitis**
- **Emphysematous Cholecystitis**
- **Emphysematous Pyelonephritis**

Goals for each topic:

- **Case Presentation**
- **Anatomy**
- **Differential**
- **Menu of Tests**
- **Medicine/Surgery**



Our First Patient

- **46F w/ N/V x 2d**
- **Diabetes Mellitus Type I**
- **h/o pyelonephritis**
- **+ Ecoli in urine**
- **CT to r/o abcess or pyelonephritis**





Is this a CT or MRI?



Courtesy of Dr. Martina Morrin, BIDMC Boston, MA

CT

- **BONE = white**
- **FAT = black**

MRI

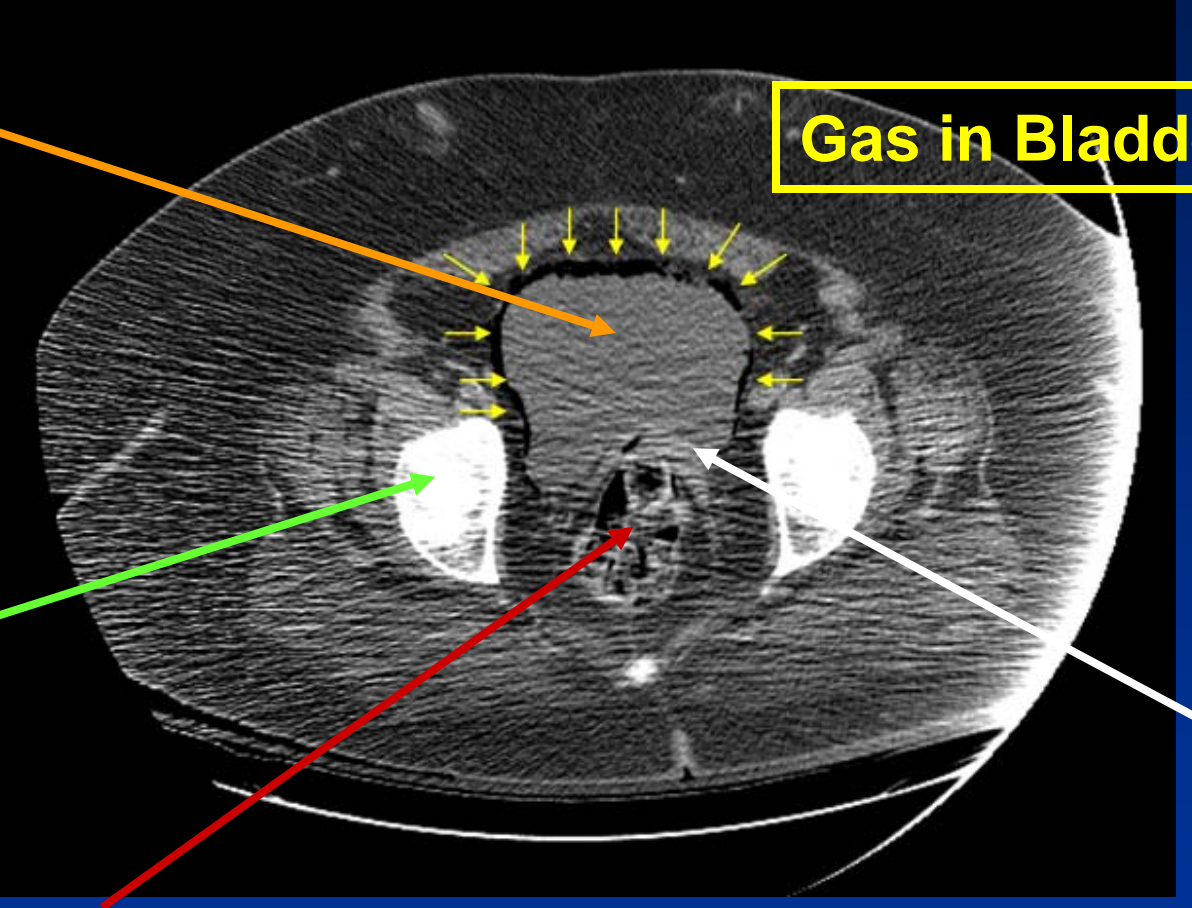
- **BONE = black**
- **FAT = white**



Anatomy of Axial CT Section

Bladder

Gas in Bladder Wall



Femur

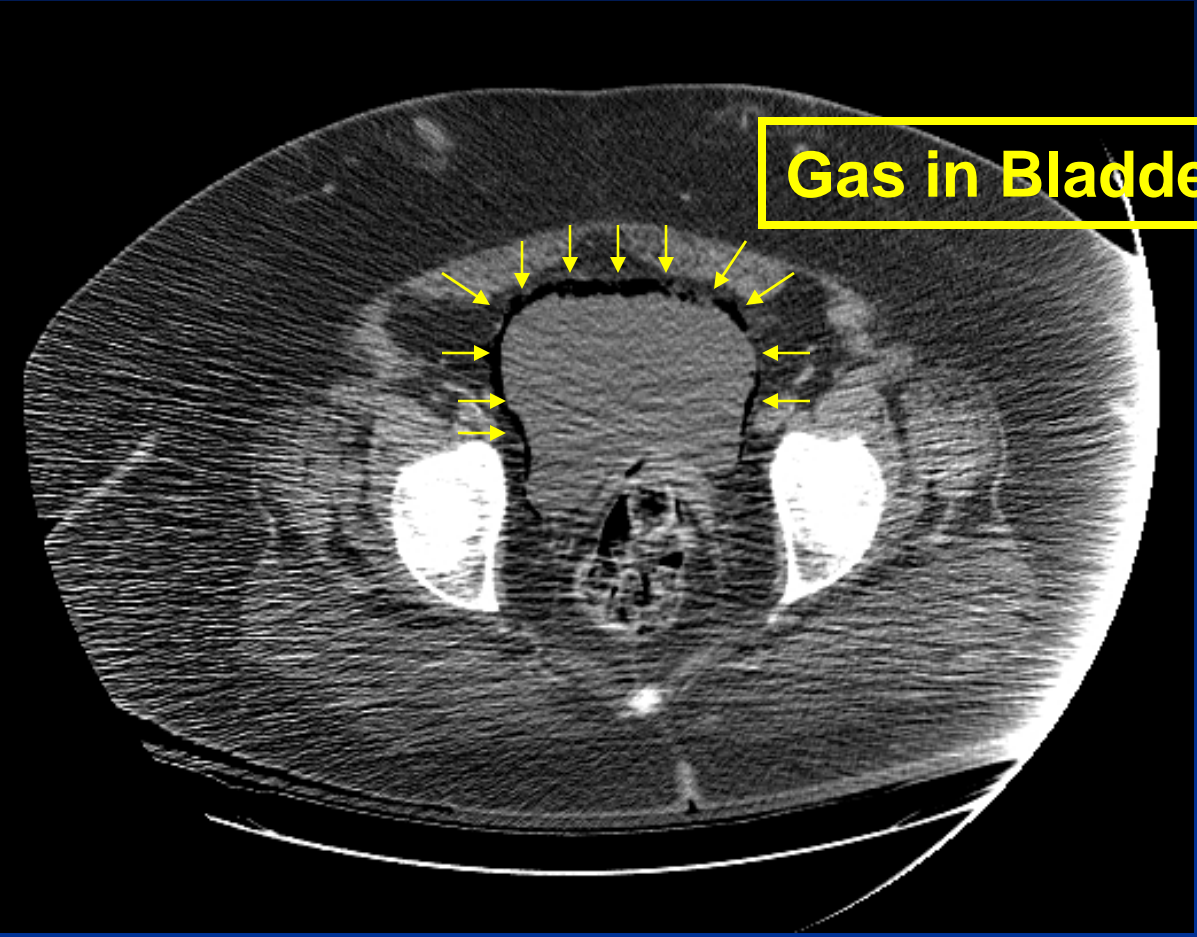
Vagina

Rectum w/ feces

*Courtesy of Dr. Martina Morrin,
BIDMC Boston, MA*



What is the differential?



Courtesy of Dr. Martina Morrin, BIDMC Boston, MA



Ddx for Air in Bladder Wall

- Air from Outside
 - Iatrogenic – trauma, suprapubic cystostomy
- Air from Inside
 - Necrotic bladder wall – post-radiation, trauma, embolic
- Air from Gas Forming Organism
 - Emphysematous Cystitis



Emphysematous Cystitis

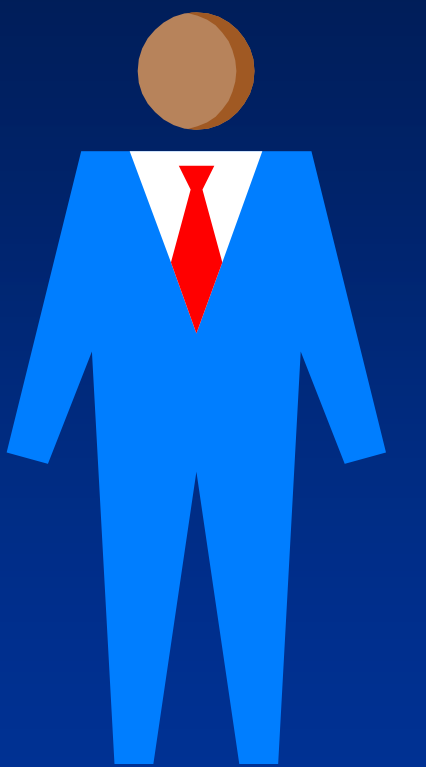
- Clinical/Physical findings not specific
- Usually 1st suspected by radiological exam
- KUB may show radiolucent line outlining bladder
- CT most sensitive means to confirm diagnosis

- 50% of cases are in diabetics
- Common organisms *E. coli* and *E. aerogenes*
- Bacterial fermentation of glucose gives carbon dioxide gas, which collects in lumen of submucosa of bladder
- Treated non-surgically with IV antibiotics



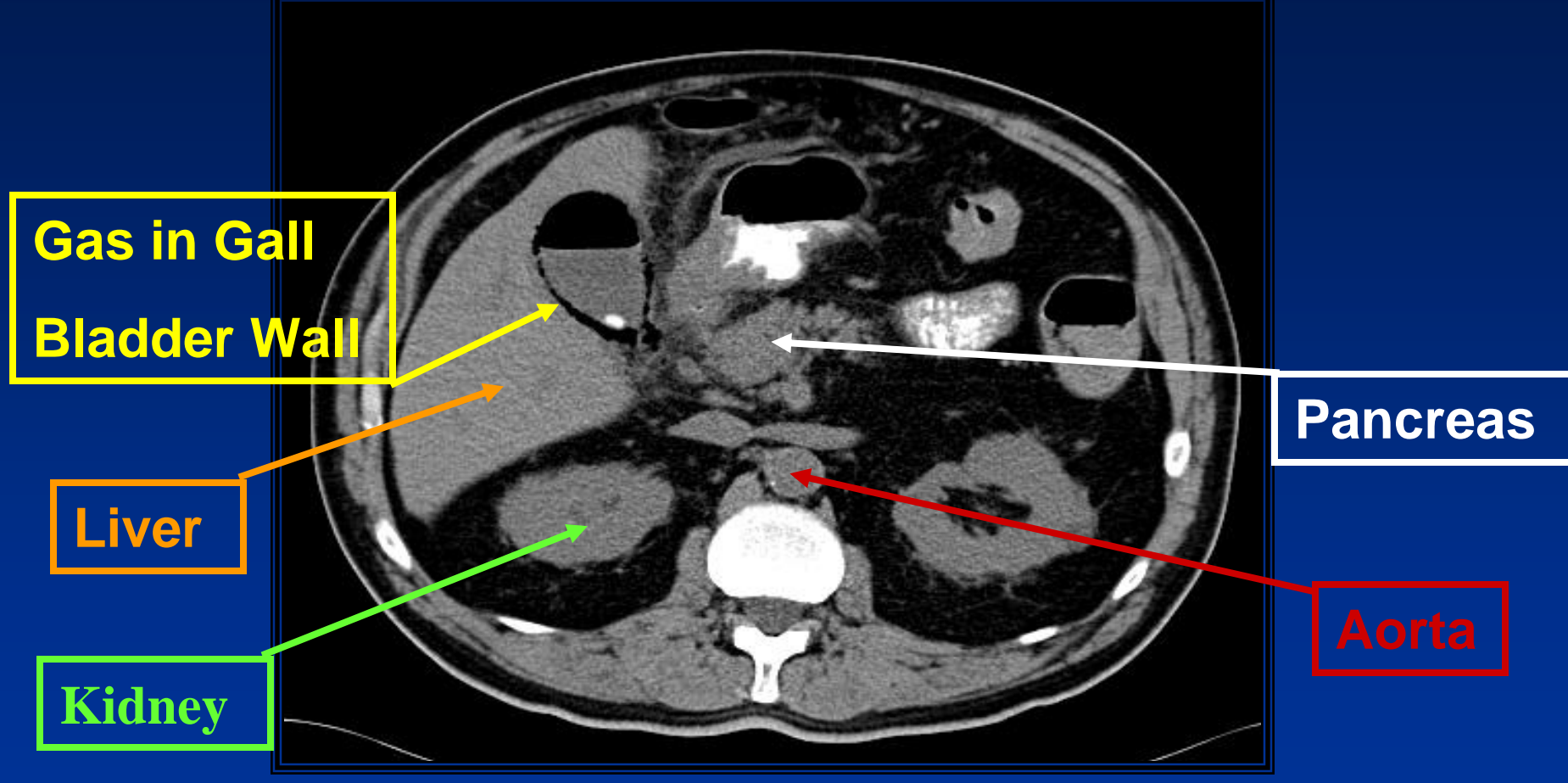
Our Second Patient

- 47M w/ RUQ pain
- Diabetic
- CT to r/o pathology





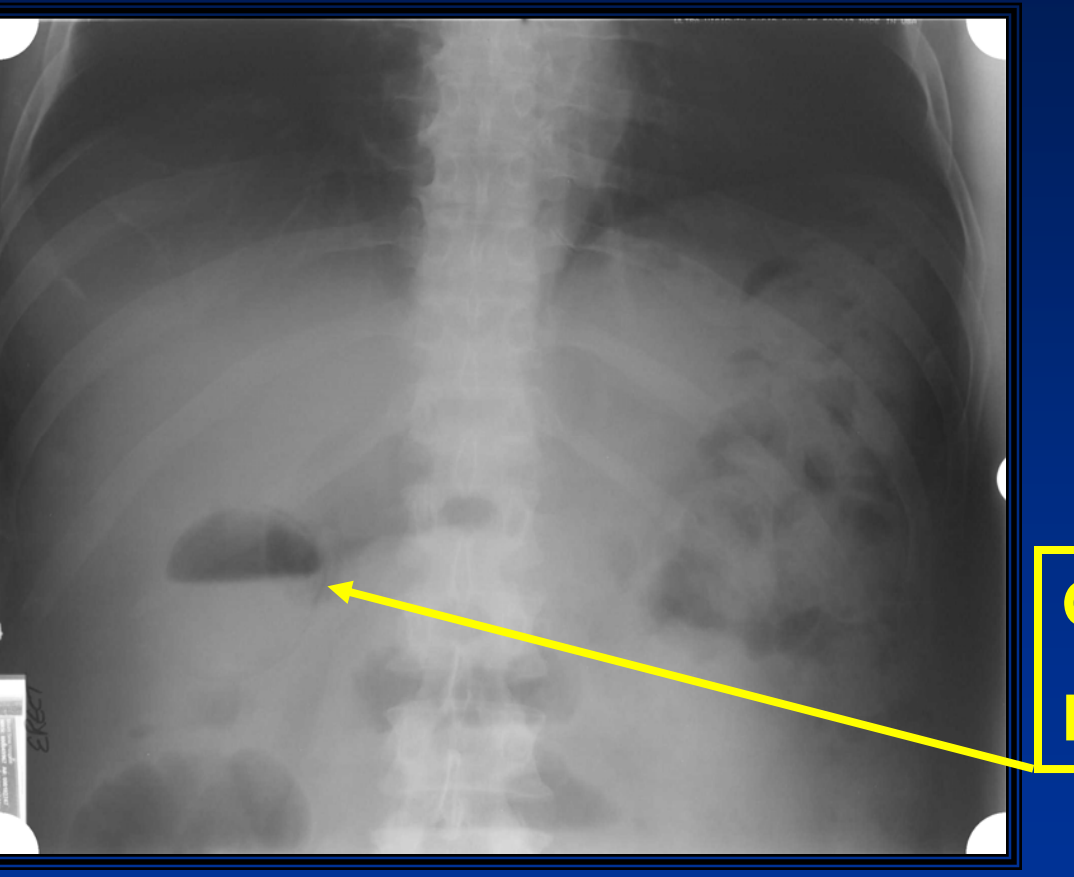
Anatomy of Axial CT Section



Courtesy of Dr. Nir Stanietzky, BIDMC Boston, MA



What is the differential?



**Gas in Gall
Bladder Wall**

Courtesy of Dr. Nir Stanietzky, BIDMC Boston, MA



Ddx for Air in Gall Bladder Wall

- Air from Outside
 - Iatrogenic – postoperative (Whipple)
- Air from Inside
 - Carcinoma, biliary-enteric fistula, perforative cholecystitis
- Air from Gas Forming Organism
 - Emphysematous cholecystitis



Emphysematous Cholecystitis

- Can be imaged by KUB, ultrasound, and CT
- Curvilinear gaseous artifacts on u/s are called “ring-down effect” or “comet tail”
- 38-55% are diabetic
- Patients are elderly, Male predominance
- Organisms *E. coli* and *Klebsiella*
- 1/3 infected with *Clostridia Weichii*
- Perforation 5x as common as non-emphysematous cholecystitis; surgically remove
- Pathophysiology: Primary Vascular Etiology
 - Occlusion of cystic artery leads to ischemic environment in which gas-forming organisms thrive.



Our Third Patient

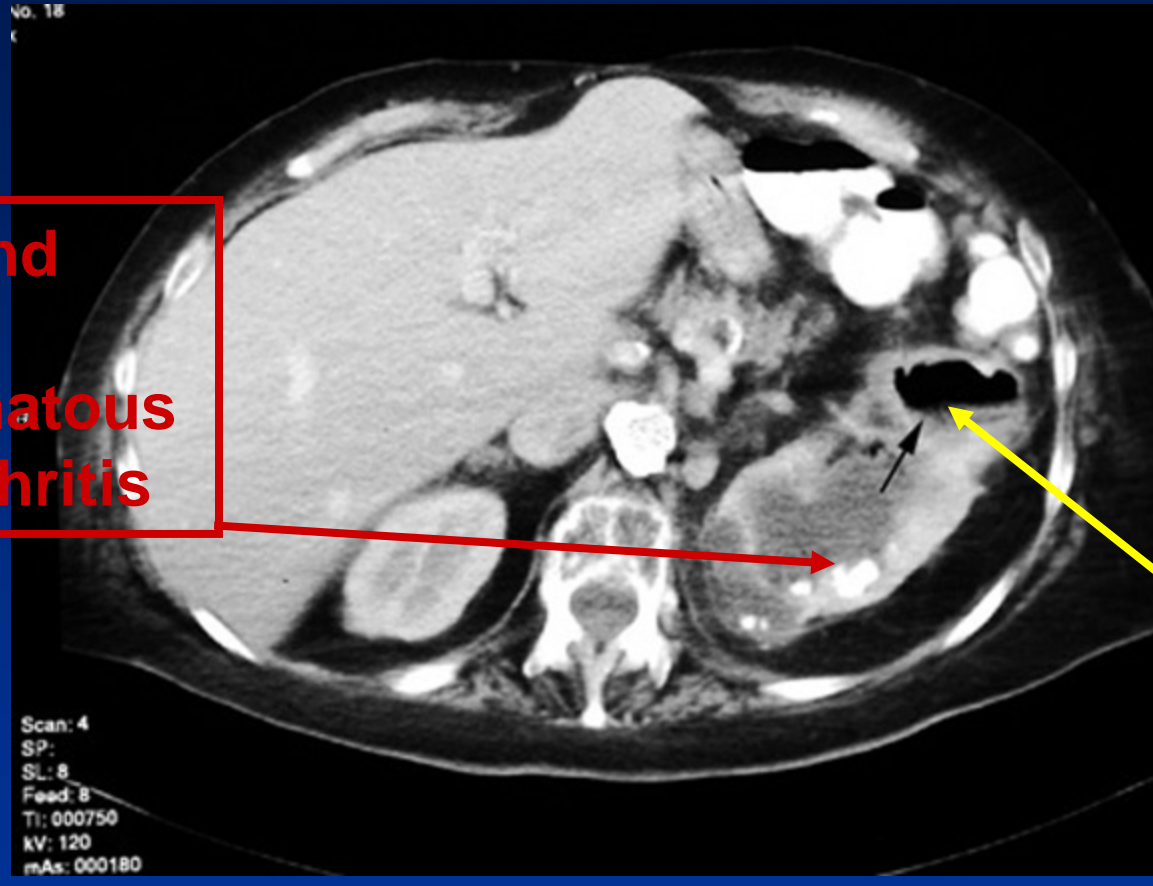
- **59M w/ generalized weakness**
- **Diabetic**
- **CT to r/o pathology**





Anatomy of Axial CT Section

**Stones and
xantho-
granuloma-
tous
pyelonephritis**

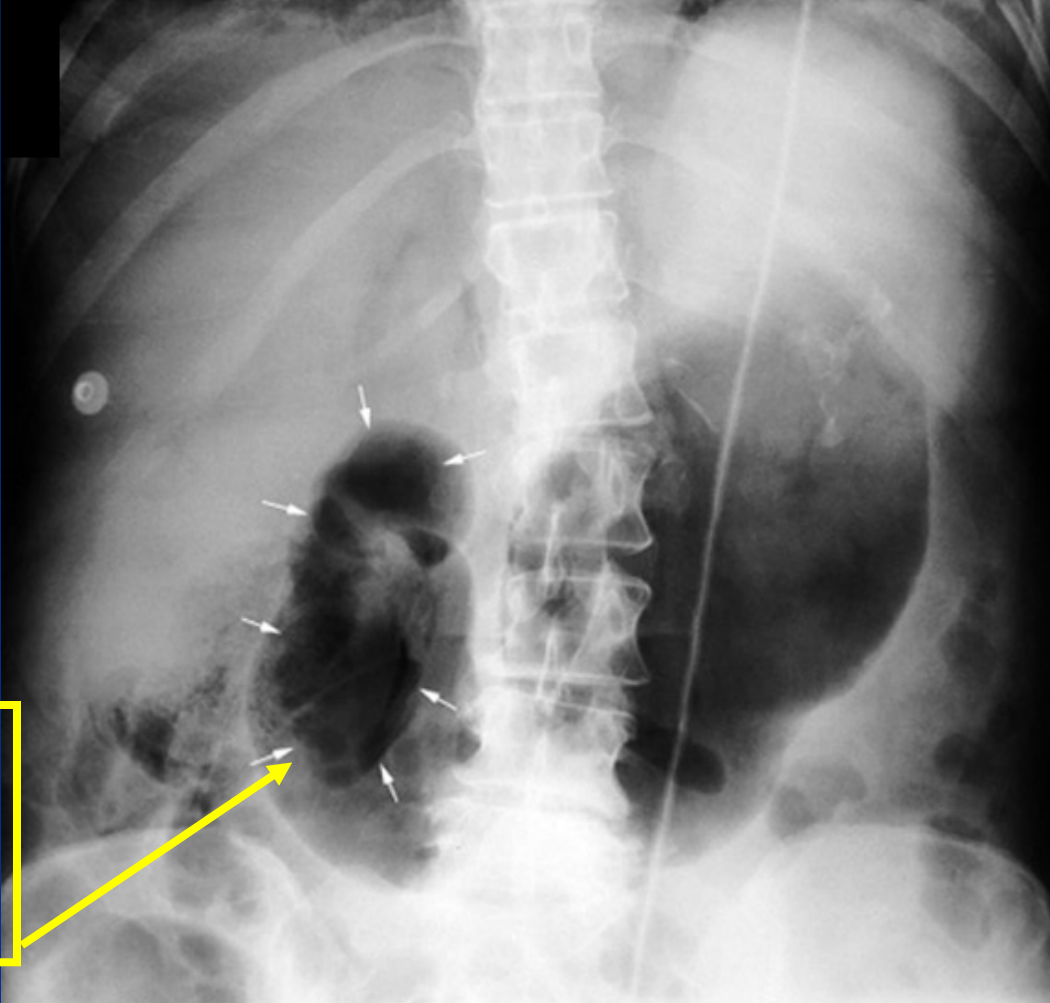


**Gas in
Kidney**

*Dr. Sugandh Shetty, MD, Dept. of Urology, William Beaumont Hospital
<http://author.emedicine.com/med/topic3440.htm>*



What is the differential?



*Dr. Sugandh Shetty, MD, Dept. of Urology, William Beaumont Hospital
<http://author.emedicine.com/med/topic3440.htm>*



Ddx for Air in Kidney Wall

- Air from Outside
 - Iatrogenic – postoperative, percutaneous removal of renal calculus, retrograde pyelogram
- Air from Inside
 - Carcinoma, fistula
- Air from Gas Forming Organism
 - Emphysematous pyelonephritis
 - Renal abscess
 - Infected hematoma



Emphysematous Pyelonephritis

- **Most reliable diagnostic imaging modality is CT; intraparenchymal gas is clearly identified on unenhanced CT scans**
- **Ultrasound provides less specific information due to confusion with surrounding bowel gas or renal calculi**
- **95% of patients have diabetes**
- **Most common organisms is E. coli**
- **Nephrectomy is the treatment of choice**



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