Emphysematous Infections in Diabetics

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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?

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

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

Courtesy of Dr. Martina Morrin, BIDMC Boston, MA
Anatomy of Axial CT Section

- Bladder
- Gas in Bladder Wall
- Femur
- Rectum w/ feces
- Vagina

Courtesy of Dr. Martina Morrin, BIDMC Boston, MA
What is the differential?

Gas in Bladder Wall

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

- Gas in Gall
- Bladder Wall
- Liver
- Kidney
- Pancreas
- Aorta

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 Clostridium 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 xanthogranulomatous 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?

Gas over Kidney Region

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
References


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