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- A 50 y/o woman known case of DM and HTN and Sjögren's syndrome presented with left flank pain and anuria
- BP 95/65 mmHg
- PR 110/ min
- BS 380 mg/dl
- WBC 10300
- Hb 10.5
- PLt 47000

Cr 3.4 mg/dl

U/A WBC many

RBC 3-4

Prot 1+

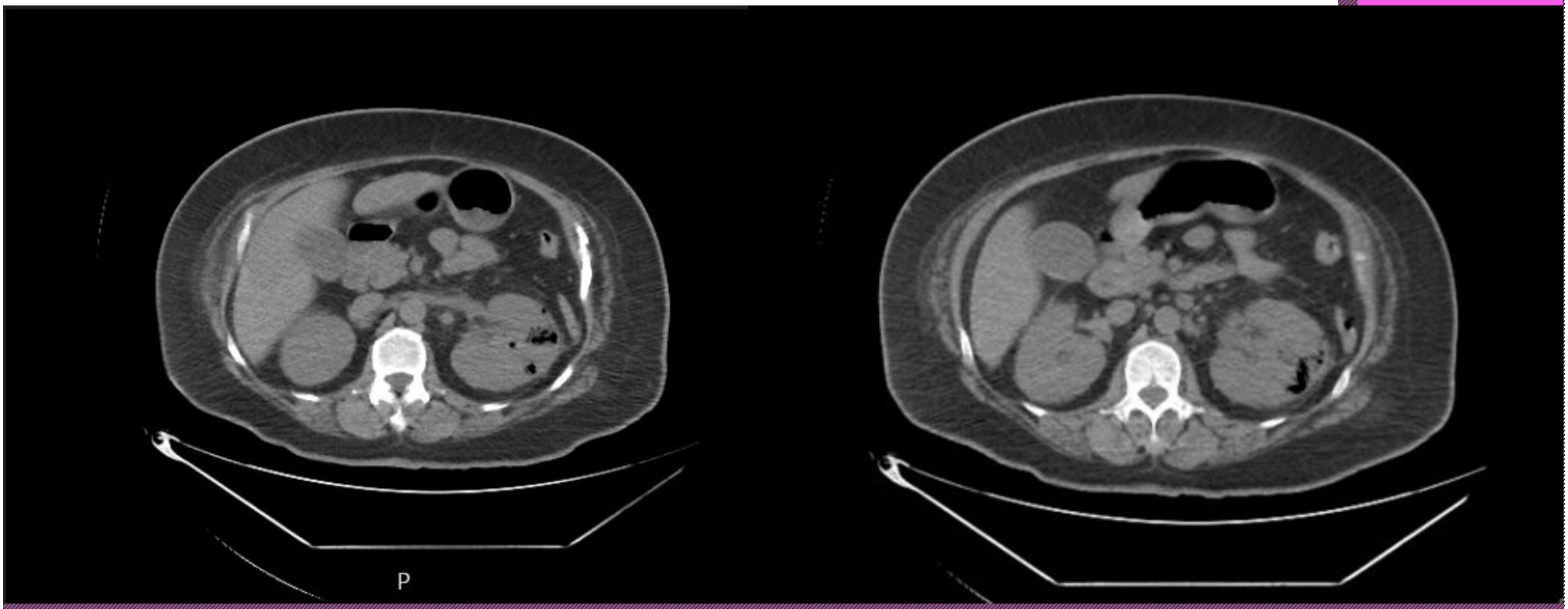
Bacteria +

Alb 3.4 mg/dl

- Patient was admitted in ICU
- Because of low blood pressure and tachycardia **sepsis** work up was done
- Drug prescription : Norepinephrine ,Piperacillin-Tazobactam
- Because of anuria hemodialysis was started

- The patient condition worsened and severe pancytopenia was occurred
- The imaging study on admission showed evidence of pyelonephritis with just increased echogenisity in ultrasound

- Blood Culture and Urine culture:
- **E-coli** isolated
- **Sensitive** : Gentamycin – Imipenem – Colistin – Ceftazidim – Tazobactam
- **Resistance** : Cefazolin – Cefotaxime – Ceftriaxone - Ciprofloxacin – Trimethoprime-Sulfamethoxazole
- Because of patient poor condition renal CT scan was performed in second day of admission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NEXT STEP

- **Traditional terminology**
- Acute uncomplicated UTI : cyctitis or pyelonephritis in a non pregnant woman without underlying urologic abnormality and other patients have complicated UTI

- **Acute Complicated UTI**: UTI with fever or other systemic symptoms including chills or malaise, Pyelonephritis , UTI with sepsis or bacteremia
- **Acute simple cyctitis** : no signs or symptoms that suggest an upper tract or systemic infection
- So patients with urologic abnormality or immunocompromised condition or poor control DM are not categorized as complicated UTI if they have no systemic symptoms

- ***Escherichia coli*** most frequent cause of Acute complicated UTI
- Other organisms : *Klebsiella*, *Pseudomonas*, and other *Enterococcus* or *Staphylococcus* species.

- Residential care patients, diabetics, and those with indwelling catheters or immunocompromise can also colonize with ***Candida.***

- In the United States, there are over 626,000 hospital admissions a year for complicated UTIs, comprising about 1.8% of all annual hospitalizations, with 80% of these being non-catheter related

- About 20% of all **bacteremias** associated with health care originate from the urinary tract. The mortality associated with these urinary tract-based bacteremias can be up to 10%.

- **Pyelonephritis:** Symptoms of cystitis with features of systemic illness include fever , chills,rigors, flank pain , CVA tenderness , nausea and vomiting
- **Prostatitis** : cystitis symptoms that are recurrent or accompanied by pelvic or perineal pain
- Pyuria is present in almost all patients with UTI
- **Nonspecific signs** or symptoms in older patients such as falls , change in functional status or mental status

- Sepsis / septic shock
- Bacteremia
- Multiple organ dysfunction
- Acute renal failure
- Specially in patients with urinary tract obstruction or abnormality or **instrumentation**, and old age and **diabetic** patients

- Severely ill patients
- Persistent symptoms after 48-72 h of appropriate treatment
- Possibility of urinary obstruction (decline urine output or GFR)
- Recurrent symptoms within a few weeks of treatment
- **CT scan** is the study of choice for detecting anatomical abnormality or abscess or stone or gas-forming infections, obstructions, an is more sensitive than ultrasound

- Pyuria and bacteriuria in a patient with sign or symptoms of cystitis with fever
- In patient with fever and CVAT with pyuria and bacteriuria
- Fever and sepsis w/o localizing symptoms in the setting of pyuria and bacteriuria if other causes have been ruled out.

- For management of complicated UTI **we must know**:
- Risk factors for drug resistance
- Previous positive urine culture
- Indications for hospitalization

- **It depends to** :
  - Severity of illness
  - Risk factors for resistant pathogen
  - Patient tolerability
  - Prior antimicrobial use
  - Local community resistance
  - Drug toxicity and interaction
  - Drug cost

- **Hospitalized and critically ill patient or urinary tract obstruction:**
  - Drug of choice is carbapenem plus vancomycin
- **Other hospitalized patients:**
  - Ceftriaxon , piperacillin-tazobactam or fluoroquinolone

- **Outpatient :**
- Fluoroquinolone in low risk resistance area
- One dose of parenteral agent before fluoroquinolone (ceftriaxone, carbapenem, gentamycin) if fluoroquinolone resistance is more than 10%

- For patients with fluoroquinolone adverse effects or contraindication:
- TMP-SMX or Amoxicilline-clavulanate after single parenteral dose

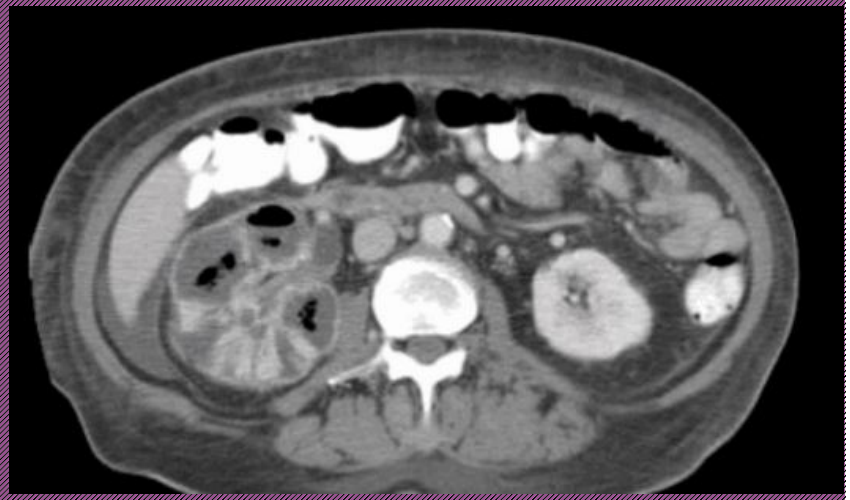
- **Broad-spectrum, empiric antibiotics** should always be switched to a targeted narrow-spectrum antibiotic once culture results are available.

- Aztreonam/avibactam
- Cefepime-enmetazobactam
- Cefepime-zidebactam
- Cefiderocol
- Ceftazidime/avibactam
- Ceftolozane/tazobactam
- Eravacycline
- Glycylcyclines
- Imipenem/relebactam
- Meropenem/vaborbactam
- Omadacycline
- Plazomicin
- Tebipenem

- Gas forming organisms can involve bladder (**cystitis**) , renal pelvis (**pyelitis**) or kidney (**pyelonephritis**)
- Most patients with the condition have **diabetes** (95%), which is 6 times more common in women than men. It is also associated with renal failure, urinary tract obstruction, polycystic kidneys, and an immunocompromised state

- **Clinical presentation**:
- Pyuria (87%), Fever (80%), Flank pain (63-74%), Tachycardia(65%), Dysuria(60%)
- **Poor prognostic factors** include azotemia, thrombocytopenia, shock, hyponatremia, confusion, and hypoalbuminemia
- Acute anuric kidney injury is an uncommon complication of emphysematous pyelonephritis with bilateral infection

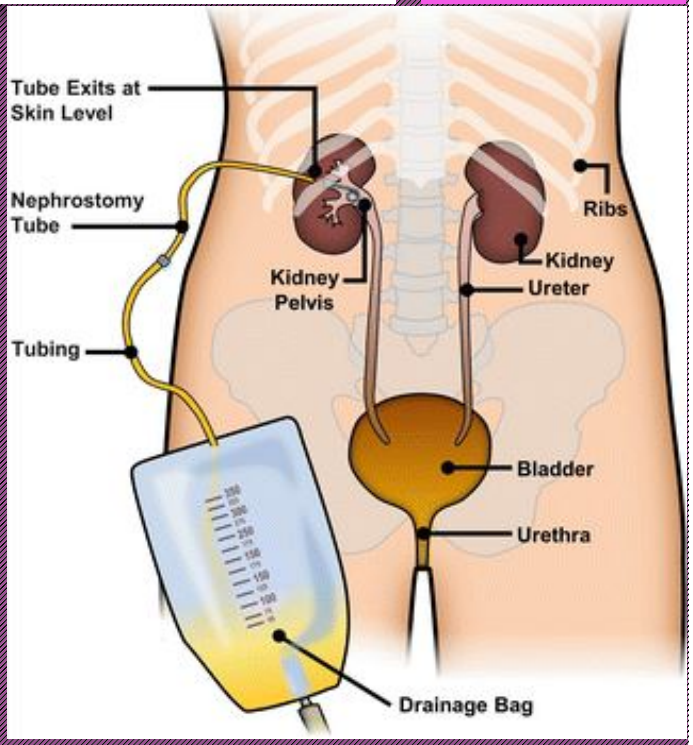
- CT scan is the best choice
- Plain abdominal X-ray is 50-85 % sensitive
- Ultrasound 68% sensitive



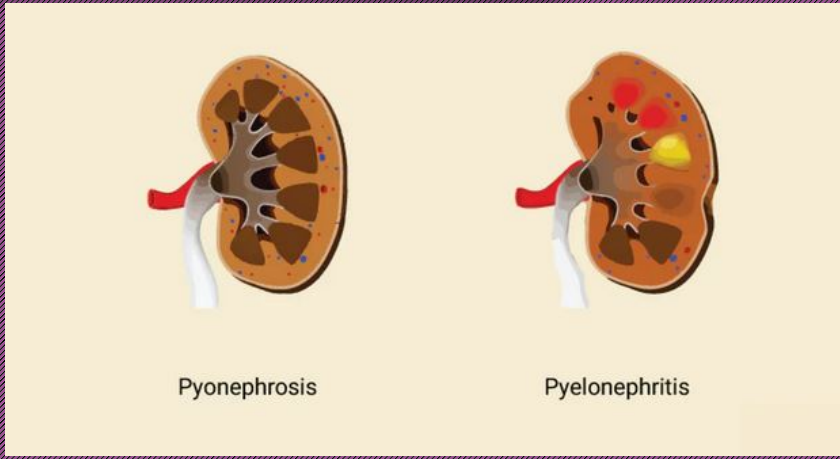
1. Gas in collecting system only
2. Parenchymal gas only
3A. Extension of gas into perinephric space
3B. Extension of gas into pararenal space
4. EPN in solitary kidney or bilateral disease

- **Isolated emphysematous pyelitis** : patients with gas limited to the collecting system **antimicrobial therapy** is sufficient unless obstruction happened

- **Renal involvement**: Antibiotic therapy and drainage of gas and purulent material
- **Nephrectomy** for persistent or worsening infection despite other managements



- Acutely infected, hydronephrotic kidney with usually obstructing calculus.
- Sepsis rapidly ensues unless the obstruction is quickly relieved by drainage from a double-J stent or percutaneously
- High fever, chills, flank pain
- The urine may sometimes not show any obvious signs of infection if the affected renal unit is obstructed.
- Dx: US , CT Scan



- Frail, older, or debilitated patients with nonspecific signs such as unexplained falls or changes in mental status .
- Multidrug-resistant infections are becoming a major source of in-hospital morbidity and mortality.
- Identifying predisposing factors for the infection and correcting them, if possible, is helpful. For example, a diabetic patient would benefit from improving glycemic control.

- Long-term antibiotic prophylaxis must also be used with caution, as it will increase the risk of resistance and change the susceptibilities of colonized organisms
- Renal tract anatomic abnormalities should be assessed to see if an intervention is appropriate.
- If unavoidable, care should be taken to use the optimal dose and duration of therapy with regular, routine monitoring of renal function.

- Because of patient poor condition and severe sepsis and severe thrombocytopenia nephrectomy was performed .
- Serum creatinine at discharge was normal . 1.2 mg/dl

- Thank you