

# EMPHYSEMATOUS PYELONEPHRITIS



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# INTRODUCTION



- Emphysematous pyelonephritis (EPN) is a **severe** necrotizing infection that affects the upper urinary tract, involving the renal parenchyma and the perirenal tissues of the kidney.
- Organisms - **Escherichia coli and Klebsiella pneumoniae** [most common] Proteus, Enterococcus, Clostridium, Aspergillus, and rarely Candida.
- 90% of cases, patients with EPN **have diabetes mellitus, obstructive uropathy, and hypertension** as the most common risk factors.
- **Gas** accumulation observed in EPN is likely a consequence of **microbial fermentation** of glucose and lactate, producing gases such as carbon dioxide, hydrogen, and nitrogen.

# SYMPTOMS AND LABS



## Symptoms:

- Fevers, chills, dysuria, nausea, and vomiting are the presenting symptoms and signs of EPN.
- Other physical signs include abdominal pain, loin tenderness, and pneumaturia or palpable crepitus.

## Laboratory findings:

- Pyuria, leukocytosis, hyperglycemia, and elevated serum creatinine.
- Bacteremia is also relatively common.

**CT imaging** is the most effective diagnostic tool to detect EPN.

Gas forming &  
necrotizing infection

## Risk Factors



**Diabetes**



**Urinary Tract  
Obstruction**

Renal  
Papillary  
Necrosis

Ureteric  
Stones

## Microbiology



E.coli  
Klebsiella

#Nephro Visuals @DrPSVali



## CT Scan KUB

is the Diagnostic  
modality of  
choice

# Emphysematous Pyelonephritis

## Prognostic Classification



**Class I**

Gas in the  
Collecting  
System



**Class II**

Gas in the  
Renal  
Parenchyma



**Class III A**

Extension into  
perinephric  
space  
(Between  
capsule & Fasia)



**Class III B**

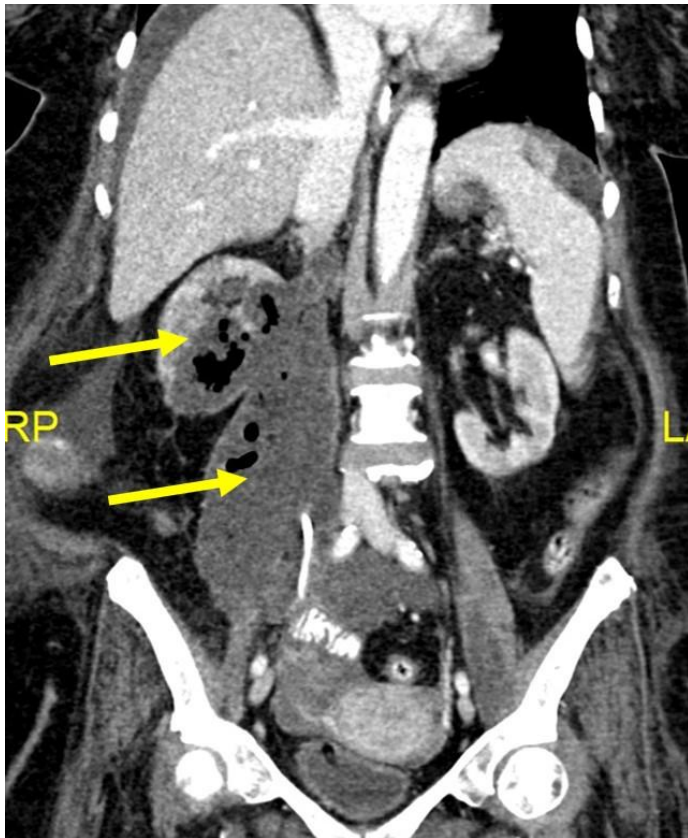
Extension into  
para renal  
space  
(Beyond renal  
fascia)



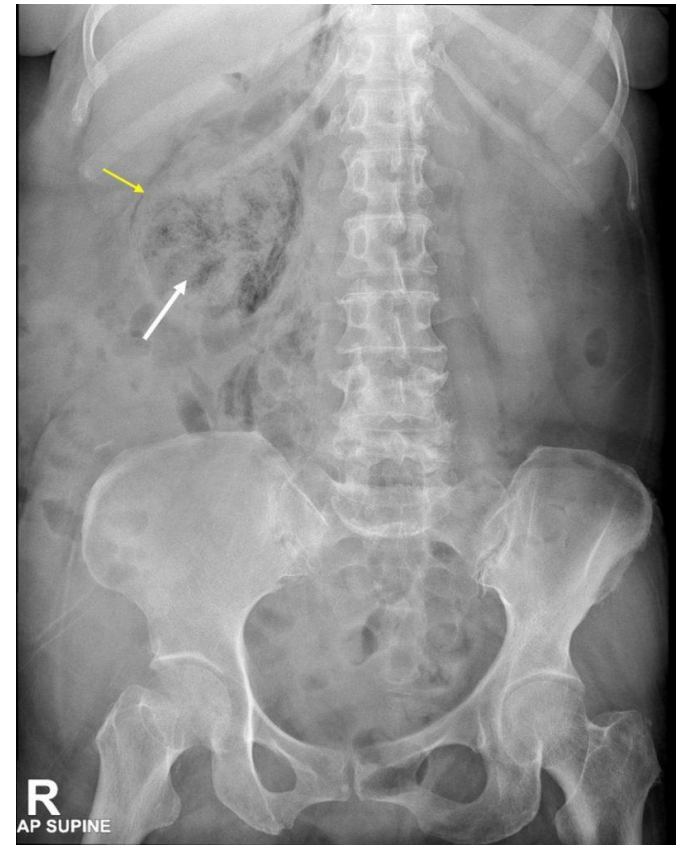
**Class V**

Gas in both the  
kidneys or in a  
solitary functioning  
Kidney

Huang and Tseng Classification of EPN



CT Findings of emphysematous pyelonephritis with yellow lines showing air pockets.



Abdominal radiograph shows mottled appearance overlying right renal region (white arrow). Curvilinear lucent lines are also seen conforming to the shape of right kidney.

# TREATMENT



- **Classes 1 and 2 EPN:** **Medical management** alone or combined with percutaneous drainage can yield favorable outcomes.
- **Classes 3A and 3B EPN:** These are further divided into 2 categories:-
  - **1.** In patients with **fewer than 2 risk factors:** Medical management plus percutaneous drainage yields a survival rate of 85%.
  - **2.** In patients with **more than 2 risk factors:** Medical management plus percutaneous drainage proved unsuccessful in 92% of cases.
- Higher proportion of patients requiring nephrectomy in this group.

# TREATMENT



**Risk factors** with increased **mortality**:-

- 1. diabetes mellitus, 2. thrombocytopenia, 3. acute renal failure, 4. altered level of consciousness, and 5. shock.
- **Class 4 EPN:** The initial step remains medical management plus percutaneous drainage.
- In any class of EPN, if renal preservation with medical management and percutaneous drainage proves unsuccessful, the **subsequent step is nephrectomy**.



