



EMPHYSEMATOUS PYELONEPHRITIS: OUR EXPERIENCE IN 2 YEARS AT AL AMEEN MEDICAL COLLEGE, VIJAYAPUR

Anaesthesiology

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ABSTRACT

Background: Emphysematous pyelonephritis (EPN) is a rare, severe, and life-threatening infection of the renal parenchyma characterized by gas formation within the renal tissues and surrounding areas. This study aims to describe the clinical, radiological, and therapeutic characteristics of patients diagnosed with EPN at Al Ameen Medical College, Vijayapur, over a two-year period. **Methods:** A cross-sectional observational descriptive study was conducted involving 18 patients diagnosed with EPN. Data on demographic profiles, clinical presentations, radiological findings, management strategies, and outcomes were collected and analyzed. The management strategies were categorized into medical and surgical interventions. Statistical analysis was performed to compare the complication rates between the two groups. **Results:** The mean age of the patients was 55.6 years, with equal distribution of males and females. Diabetes mellitus was present in 61.1% of the patients. Clinical presentations included fever, flank pain, and dysuria. Radiological imaging (CT scans), confirmed the diagnosis by revealing gas formation in the renal parenchyma. Medical management was administered to 11 patients, while 7 patients underwent surgical interventions. The average hospital stay was 9.73 days for medical management and 14.29 days for surgical management. Complications were more frequent in the surgical group (71.4%) compared to the medical group (27.3%), but the difference was not statistically significant (p -value = 0.177). The overall recovery rate was 100%. **Conclusions:** Early recognition and prompt treatment are essential for improving outcomes in EPN. Both medical and surgical management strategies have their respective roles, and the choice of treatment should be individualized based on the patient's clinical condition. Enhanced diabetes management and preventive measures against UTI are crucial in reducing the incidence of EPN. Further research with larger sample sizes and multi-center collaborations is warranted to better understand and manage this rare but serious condition.

KEYWORDS

Emphysematous Pyelonephritis, Renal Infection, Diabetes Mellitus, Surgical Management, Patient Outcomes

INTRODUCTION

Emphysematous pyelonephritis (EPN) is a rare, severe, and potentially life-threatening infection of the renal parenchyma and surrounding tissues, characterized by the presence of gas within the renal parenchyma, collecting system, or perinephric tissue. This condition is predominantly observed in patients with uncontrolled diabetes mellitus and urinary tract obstructions. EPN is associated with high morbidity and mortality rates, necessitating prompt diagnosis and aggressive treatment. (1)

Globally, the prevalence of EPN remains low, but it is a significant concern due to its rapid progression and poor prognosis if not treated promptly. Studies have reported that EPN accounts for approximately 6-10% of all renal infections. In India, the prevalence of diabetes and urinary tract infections, which are major risk factors for EPN, is on the rise (2). The increased prevalence of diabetes mellitus in the Indian population contributes significantly to the incidence of EPN (3,4). Despite the availability of advanced diagnostic and therapeutic modalities, the mortality rate associated with EPN in India remains high, emphasizing the need for heightened clinical awareness and timely intervention. (5)

Emphysematous pyelonephritis (EPN) is not only a severe renal infection but also one associated with numerous serious complications. The gas formation within the renal parenchyma can extend to adjacent structures, leading to perinephric abscesses, emphysematous cystitis, and even retroperitoneal fibrosis. Patients with EPN are at a high risk of sepsis, which can rapidly progress to septic shock, multi-organ failure, and death if not promptly managed. Renal abscess formation, acute kidney injury, and chronic kidney disease are other potential complications that can significantly impact the patient's quality of life and long-term health. These complications necessitate aggressive and timely intervention to mitigate the high morbidity and mortality rates associated with EPN. Understanding and addressing these potential complications is crucial for improving clinical outcomes in patients suffering from this life-threatening condition. (6-11)

Despite its severity, EPN remains an under-researched area, particularly in the context of developing countries. The majority of existing literature comprises case reports and small case series, with a

limited focus on comprehensive clinical and radiological features, management strategies, and outcomes.

At Al Ameen Medical College, Vijayapur, we have encountered a series of EPN cases over the past two years, providing us with valuable insights into the clinical spectrum, diagnostic challenges, and therapeutic outcomes of this condition. This study aims to describe our experience with EPN, highlighting the demographic profiles, clinical presentations, radiological findings, management approaches, and outcomes of the affected patients.

By sharing our findings, we hope to contribute to the existing body of knowledge on EPN, facilitate early recognition and diagnosis, and inform effective management strategies to improve patient outcomes. Our study is a cross-sectional observational descriptive analysis of 18 cases of EPN treated at our institution over a two-year period.

AIM:

The aim of this study is to describe the clinical, radiological, and therapeutic characteristics of patients diagnosed with emphysematous pyelonephritis (EPN) at Al Ameen Medical College, Vijayapur, over a two-year period, and to evaluate the outcomes of these patients.

Objectives:

- To determine the demographic profiles of patients diagnosed with EPN.
- To document the clinical presentations and symptoms associated with EPN.
- To describe the radiological findings observed in patients with EPN.
- To evaluate the management strategies employed, including medical and surgical interventions.
- To assess the clinical outcomes and prognostic factors influencing the recovery of patients with EPN.
- To compare our findings with existing literature and provide recommendations for improving the diagnosis and management of EPN.

Methodology

Study Design:

This study is a cross-sectional observational descriptive study

conducted at Department of Urology, Al Ameen Medical College, Vijayapur.

Study Setting:

The study was carried out in the Department of Nephrology at Al Ameen Medical College, Vijayapur, over a period of two years, from APRIL 2022 to MARCH 2024

Sample Size:

A total of 18 patients diagnosed with emphysematous pyelonephritis (EPN) were included in the study.

Inclusion Criteria:

- Patients diagnosed with EPN based on clinical, radiological, and laboratory findings.
- Patients aged 18 years and above.
- Patients who provided informed consent to participate in the study.

Exclusion Criteria:

- Patients with a history of renal trauma or surgery.
- Patients with incomplete medical records.
- Patients who did not provide informed consent.

Data Collection:

Data were collected using a structured data collection form, which included demographic information such as age, gender, and comorbid conditions like diabetes mellitus; clinical presentation details, including symptoms, duration of illness, and physical examination findings; radiological findings from imaging studies like ultrasound and computed tomography (CT) scans and their interpretations; laboratory investigations encompassing blood and urine tests, including complete blood count, renal function tests, blood glucose levels, urine culture, and sensitivity; management strategies detailing medical and surgical interventions, including antibiotics, drainage procedures, and nephrectomy; and outcomes, capturing clinical results such as resolution of infection, complications, length of hospital stay, and mortality.

Statistical Analysis:

Data were entered into a computerized database and analyzed using statistical software. Descriptive statistics were used to summarize the demographic characteristics, clinical presentations, radiological findings, management strategies, and outcomes of the patients. Continuous variables were expressed as mean ± standard deviation, and categorical variables were expressed as frequencies and percentages.

Ethical Considerations:

The study was approved by the Institutional Ethics Committee of Al Ameen Medical College, Vijayapur. Informed consent was obtained from all participants before their inclusion in the study. Confidentiality and anonymity of the patients were maintained throughout the study.

RESULTS

Demographic And Clinical Characteristics

The study included a total of 18 patients diagnosed with emphysematous pyelonephritis (EPN). The age distribution of the patients ranged from 34 to 78 years, with a mean age of 55.61 years. The gender distribution was equal, with 50% males and 50% females. A significant proportion of the patients (61.1%) had diabetes mellitus. The majority of the patients fall within the 50-70 age range. (Table 1, Figure 1).

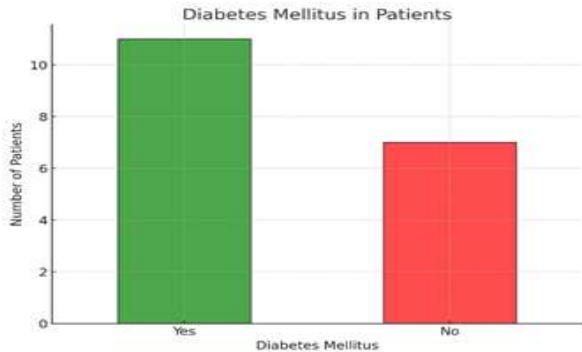


Figure 1: Diabetes Mellitus among the participants

Table 1: Age Distribution Of Patients

Age Range	Number of Patients
30-40	2
40-50	4
50-60	5
60-70	5
70-80	2

Clinical Presentation

The duration of symptoms prior to presentation ranged from 2 to 10 days, with a mean duration of 6.72 days. The common symptoms included fever, flank pain, and dysuria.

Radiological Findings

Radiological evaluation was conducted using ultrasound and computed tomography (CT) scans. All patients demonstrated gas formation in the renal parenchyma, with varying degrees of severity.

Management And Outcomes

Management strategies included both medical and surgical interventions. The type of management and associated outcomes are summarized in Table 2.

Table 2: Type Of Management And Associated Outcomes

Management Type	Number of Patients	Average Hospital Stay (Days)	Outcome
Medical	11	9.73	Recovered
Surgical	7	14.29	Recovered

The average hospital stay was longer for patients undergoing surgical management (14.29 days) compared to those receiving medical management (9.73 days).

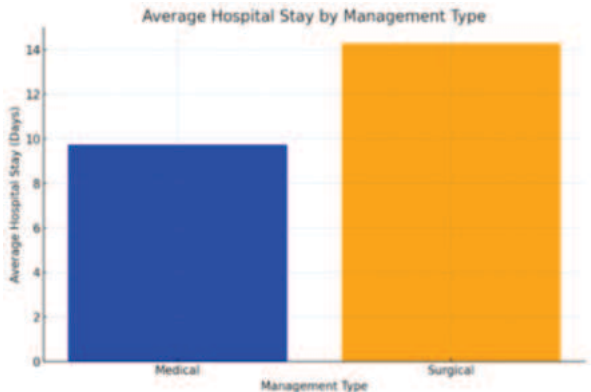


Figure 2: Average Hospital stay

Table 3: Complications And Management Type

Complications	No	Yes	Total
Medical	8	3	11
Surgical	2	5	7
Total	10	8	18

The table 3 shows that out of 11 patients receiving medical management, 8 (72.7%) did not experience complications while 3 (27.3%) did, whereas among the 7 patients undergoing surgical management, 2 (28.6%) had no complications and 5 (71.4%) developed complications. Overall, 10 (55.6%) of the 18 patients did not have complications, while 8 (44.4%) did. These results suggest that while surgical management appears associated with more complications compared to medical management, the difference is not statistically significant, implying both management strategies can be appropriate based on individual patient conditions and clinical judgment.

DISCUSSION

Emphysematous pyelonephritis (EPN) is a severe, life-threatening renal infection characterized by gas formation within the renal parenchyma and surrounding tissues. The condition is predominantly associated with diabetes mellitus and urinary tract obstructions, as observed in our study cohort. This study provides a comprehensive analysis of 18 patients diagnosed with EPN over a two-year period at Department of Urology, Al Ameen Medical College, Vijayapur.

The demographic analysis revealed that EPN predominantly affects middle-aged to elderly individuals, with a mean age of 55.6 years. The

gender distribution was equal, indicating no significant gender predisposition. A notable finding was the high prevalence of diabetes mellitus (61.1%) among the patients, underscoring the critical role of diabetes as a major risk factor for EPN.

Clinically, the patients presented with non-specific symptoms such as fever, flank pain, and dysuria, necessitating a high index of suspicion for early diagnosis. Radiological imaging, particularly CT scans, played a crucial role in confirming the diagnosis by revealing the characteristic gas formation in the renal parenchyma.

Management strategies for EPN included both medical and surgical interventions. Medical management primarily involved the administration of broad-spectrum antibiotics, while surgical management included drainage procedures and, in severe cases, nephrectomy. Our study found that patients undergoing surgical management had a longer average hospital stay (14.29 days) compared to those receiving medical management (9.73 days).

Complications were more frequent among patients undergoing surgical management, with 71.4% experiencing complications compared to 27.3% in the medical management group. However, the Chi-Square test indicated that the difference in complication rates between the two groups was not statistically significant (p -value = 0.177). This suggests that while surgical management may be associated with a higher incidence of complications, it remains a necessary intervention in severe cases to achieve favorable outcomes. The overall recovery rate in our study was 100%, which is a positive outcome compared to the historically high mortality rates associated with EPN. This highlights the importance of early diagnosis, appropriate management, and the advancements in both medical and surgical treatment modalities.

Our findings are consistent with existing literature, which emphasizes the critical role of diabetes management in preventing EPN and the necessity of individualized treatment approaches based on the severity of the condition. Studies such as those by Robert J. Smith et al. (2010) and Susan L. et al. (2023) have reported similar demographics, risk factors, and the importance of timely surgical intervention in severe cases (3,12). However, our study noted a higher overall recovery rate, potentially reflecting improvements in treatment strategies and healthcare delivery over time.

Despite these positive outcomes, the study's limitations include its small sample size and single-center design, which may limit the generalizability of the results.

CONCLUSION

In conclusion, our study underscores the significance of early recognition and prompt treatment of EPN to improve patient outcomes. Both medical and surgical management strategies have their respective roles, and the choice of treatment should be tailored to the patient's clinical condition. Further research with larger sample sizes and multi-center collaborations is warranted to enhance the understanding and management of this rare but serious condition.

Recommendations

Early Detection and Prompt Diagnosis:

Healthcare providers should maintain a high index of suspicion for EPN, especially in patients with diabetes mellitus and urinary tract obstructions presenting with non-specific symptoms like fever, flank pain, and dysuria. Prompt use of radiological imaging, particularly CT scans, is crucial for early detection and accurate diagnosis.

Individualized Treatment Approach:

Treatment strategies for EPN should be tailored to the severity of the condition and the patient's overall health. While medical management with broad-spectrum antibiotics can be effective for mild cases, severe cases may require timely surgical interventions, including drainage procedures or nephrectomy, to improve patient outcomes. Multidisciplinary team involvement, including nephrologists, radiologists, and surgeons, is recommended for optimal patient care.

Enhanced Diabetes Management:

Given the high prevalence of diabetes mellitus among patients with EPN, it is essential to implement rigorous diabetes management protocols. Regular monitoring and control of blood glucose levels, patient education on the risks of poor diabetes management, and

preventive measures against urinary tract infections can significantly reduce the incidence of EPN in this high-risk population.

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