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Clinical determinants for optimal treatment for emphysematous pyelonephritis

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Objectives : Emphysematous pyelonephritis (EPN) is an acute necrotizing gas-forming infection of the kidney and perinephric area that leads to a poor prognosis. To achieve better clinical outcomes with minimally invasive approach, it is important to understand the factors influencing the successful conservative treatment.
Methods : Demographic data, laboratory data, clinical data, and radiologic classifications by Huang and Tseng were collected from 39 patients at a tertiary hospital. We defined conservative treatment as the use of antibiotics with or without percutaneous nephrostomy (PCN). The primary outcome was the conservative treatment failure, defined as either nephrectomy or death.
Results : The mean age was 66.2 ± 2.3 years and 26 (66.7%) patients were female. The most common comorbidity was diabetes (69.2%), followed by hypertension (51.3%) and urolithiasis (35.9%). Isolated pathogens were Escherichia coli (N = 26, 66.7%), Klebsiella pneumoniae (N = 10, 25.6%), Pseudomonas aeruginosa (N = 2, 5.1%), and Proteus mirabilis (N = 1, 2.5%). The radiologic classification system categorized the patients as follows: Class I (N = 9, 23.0%), Class II (N = 14, 35.9%), Class IIIa (N = 3, 7.6%), Class IIIb (N = 8, 20.5%), and Class IV (N = 5, 12.8%). Overall mortality rate was 18% (N = 7, 18%). All patients received broad-spectrum antibiotics at admission and 27 patients (69.2%) received PCN in the early period (< 24h). Six patients (22.2%) who received PCN subsequently required nephrectomy. Another two patients underwent emergent nephrectomy without PCN. Multivariable analysis showed that higher grading of radiologic classification (OR: 2.16, 95% CI: 1.145-4.290, p=0.018) and hypoalbuminemia (< 3.0 mg/dL, OR: 7.169, 95% CI: 1.339-38.370, p=0.021) were associated with conservative treatment failure.
Conclusions : Conservative treatment may be not suitable for EPN patients with higher grade of radiologic classification and hypoalbuminemia.

PNUH_EPN_Table 1.png

Table 1. Logistic regression analysis for the risk factors of conservative treatment failure.

	Univariable		Multivariable	
Variable	OR (95% CI)	P value	OR (95% CI)	P value
Age	0.988 (0.946-1.032)	0.591		
Sex, male	1.929 (0.489-7.605)	0.348		
Diabetes	1.950 (0.508-7.489)	0.331		
Hypertension	0.589 (0.157-2.207)	0.433		
CAD	0.528 (0.091-3.055)	0.476		
Urolithiasis	0.667 (0.111-3.990)	0.657		
Sepsis	0.625 (0.137-2.852)	0.544		
Radiologic classification	2.450 (1.344-4.468)	0.003	2.216 (1.145-4.290)	0.018
Hyponatremia (<130 mmol/L)	2.571 (0.658-10.056)	0.175		
Hypoalbuminemia (<3.0 g/dL)	10.000 (2.191-45.639)	0.003	7.169 (1.339-38.370)	0.021

Abbreviations: CAD, coronary artery disease

PNUH_EPN_Table 1.png

Table 2. Therapeutic interventions and clinical outcomes according to radiologic classification.

Grade (N = 39)	Definitions	Interventions	Clinical outcomes	
			Nephrectomy, N (%)	Death, N (%)
Class I (N = 9)	Gas within the collecting system	Antibiotics only (5)	1 (20)	0 (0)
		Antibiotics + PCN (4)	0 (0)	0 (0)
Class II (N = 14)	Gas within the parenchyma	Antibiotics only (3)	0 (0)	1 (33.3)
		Antibiotics + PCN (11)	1 (9.1)	0 (0)
Class IIIa (N = 3)	Gas outside the kidney, in the perinephric space	Antibiotics only (0)	-	-
		Antibiotics + PCN (3)	1 (33.3)	1 (33.3)
Class IIIb (N = 8)	Gas outside the kidney, in the pararenal space	Antibiotics only (2)	1 (50)	2 (100)
		Antibiotics + PCN (6)	4 (66.7)	1 (16.7)
Class IV (N = 5)	Bilateral EPN or gas in a solitary kidney	Antibiotics only (2)	0 (0)	2 (100)
		Antibiotics + PCN (3)	0 (0)	0 (0)

Abbreviations: PCN, percutaneous nephrostomy