

Factors Determining the Outcome of Renal Function in Emphysematous Pylonephritis:

P. Senthilkumar¹, R.Rajkumar^{2*}, Pv. Thiruvarul, S. Rajasekar,

Department Of Urology, Govt. Mohan Kumaramangalam Medical College & Hospital, Salem, Tamilnadu

*Corresponding Author: R.Rajkumar

Abstract: Introduction: EPN is a severe necrotizing infection of renal parenchyma and perirenal tissues that is caused by gas producing pathogenic organisms. We conducted a retrospective study at our hospital between aug 2015 and aug 2018 to investigate the factors that determine the outcome of renal function in EPN.

Methods: We retrospectively analyzed the clinical and lab data, imaging findings and outcome of pts with EPN. We studied a total of 28 patients and categorised them as conservative management group (16) and surgical intervention group (12). 8 cases presented with acute pyelonephritis, 9 cases with urosepsis and the remaining 11 patients with multioorgan dysfunction. The overall survival rate was 89.28%

Results: Among the risk factors analysed anemia, thrombocytopenia, altered sensorium, higher CT grade, proteinuria more than 3g/L, positive blood culture were significantly associated with mortality

Conclusion: EPN management requires multidisciplinary approach including hydration and electrolyte management, broad spectrum antibiotics, strict glycaemic control, effective urinary drainage and lastly it may require nephrectomy as a salvage procedure.

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I. Introduction

EPN is commonly associated with diabetes mellitus especially in females, debilitated immune-deficient individuals, and patients harbouring obstructed urinary system with infective nidus. The illness is caused by enteric gram negative bacillus such as E-coli, Klebsiella, Proteus, pseudomonas, Streptococcus and Candida.

The pathogenesis of EPN is multi-factorial. Renal vascular compromise and urinary stagnation are causative factors. Management options ranging from conservative approach including vigorous resuscitation, antibiotic treatment, glycaemic control, adequate urinary drainage and nephrectomy in refractory cases.

II. Materials and methods:

We present our experience of 28 cases of EPN treated between Aug 2015 and Aug 2018 at a tertiary care hospital in south India. We reviewed medical records for baseline patient characteristics, clinical spectrum, serum and urinary biochemical parameters, radiological findings, management and outcome. Patients were managed using various modalities in a stepwise approach based on clinical scenario, extent of radiological disease and co-morbidities.

All patients started on empirical antibiotic therapy, covering both Gram-positive as well as Gram-negative bacterial spectrum. Culture and Sensitivity-specific treatment started after urine or blood culture report was obtained. Decision of DJ stenting or pigtail catheter insertion was based on clinical and radiological extent of disease. Presence of internal echoes in pelvi-calyceal system with obstructed urinary system was immediately treated by pigtail catheter insertion.

III. Results:

Among the 28 EPN patients 19 were female and 9 male, 8 patients presented with acute pyelonephritis (APN), 9 with urosepsis, and 11 with MODS. Patients were classified according to CT scan findings.

The overall survival rate in our series was 89% (25/28). 16 cases were managed with antibiotics alone Medical group (Table -1) and 12 required surgical management (Table-2).

TABLE -1 MEDICAL TREATMENT:

Case no	Age (Yr)	gender	Clinical Presentation	Unusual feature	Ct scan Findings (class)	bacteriology	treatment	outcome	Peak scr	Altered sensorium	Shock	Low platelet
1	47	M	APN	-	I	klebsiella	MEDICAL	GOOD	3.1	yes	-	--
2	53	M	UROSEPSIS	HEPATITIS	II	STERILE	MEDICAL	GOOD	1.7	-	yes	-
3	70	F	MODS	Urinary, incontinence	III A	E.Coli	MEDICAL	GOOD	2.8	yes	-	yes
4	51	F	MODS	--	II	E.Coli	MEDICAL	GOOD	1.2	-	yes	-
5	65	F	MODS	Gas Subdiaphragmatic space	III-B	E.Coli	Medical/HD	GOOD	7.1*	yes	-	yes
6	54	M	APN	pneumonia	I	E.Coli	MEDICAL	GOOD	3.2*	-	-	-
7	55	F	APN		II	E.Coli	MEDICAL	GOOD	1.5	-	-	-
8	55	F	Urosepsis		II	E.Coli	MEDICAL	GOOD	1.2	-	-	-
9	65	M	Urosepsis	Laser prostate	II	E.Coli	MEDICAL	GOOD	5.5	-	-	yes
10	38	F	APN	abs	II	STERILE	MEDICAL	GOOD	4.2	-	-	-
11	50	F	Urosepsis	DKA	IV	STERILE	MEDICAL	GOOD	3.3	-	yes	-
12	56	F	MODS	DENGUE LIKE	II	STERILE	MEDICAL	GOOD	4.9*	yes	-	yes
13	52	M	MODS	Rhabdomyolysis	II	STERILE	Medical/HD	GOOD	6.9*	-	yes	-
14	49	M	MODS	Post renal transplant	IV	klebsiella	MEDICAL	GOOD	3.2	yes	yes	yes
15	52	M	Urosepsis	Urinary, incontinence	II	E.Coli	MEDICAL	GOOD	2.5	-	-	yes
16	52	F	MODS	hepatitis	II	STERILE	MEDICAL	GOOD	3.6	-	yes	--

TABLE -2 : SURGICAL INTERVENTION:

Case no	Age (Yr)	gender	Clinical Presentation	Unusual feature	CTscan Findings (class)	bacteriology	treatment	outcome	Peak scr	Altered sensorium	Shock	Low platelet
1	72	F	MODS	--	III A	klebsiella	PCD+DJS	Recovered	2.1	-	--	yes
2	65	M	UROSEPSIS	-	III B	Kleb+E.Coli	PCD+DJS	Recovered	3.2	-	yes	-
3	38	F	Urosepsis	-	II	E.Coli	DJS	Recovered	1.7	-	-	-
4	33	F	MODS	ESKD ON MHD [^]	II	klebsiella	DJS	ESRD	7.1	yes	yes	yes
5	48	M	MODS	Gua in serotum hump [^]	III	Kleb+E.Coli	PCD+DJS	Recovered	7.5	yes	yes	-
6	36	F	Urosepsis	-	II	E.Coli	DJS	Recovered	2.2	-	-	-
7	33	F	APN	-	II	E.Coli	DJS	Recovered	2.2	-	-	-
8	30	F	MODS	-	III	E.Coli	PCD+DJS	Died	3.5	-	-	-
9	48	F	APN	1 st Episode D KA	III	E.Coli	PCD+DJS	Recovered	1.2	yes	yes	yes
10	42	F	APN	Low albumin [^]	II	E.Coli	DJS	Recovered	3.6	-	-	-
11	55	F	APN	-	II	E.Coli	DJS	Recovered	2.2	-	-	-
12	50	F	Urosepsis	-	IV	E.Coli	PCD+DJS	Died	3.7	yes	-	yes

The Mortality of the patients treated with antibiotics alone was 1/16 (6.25%) and 2/12 (16.6%) in those requiring surgical management. Surgical treatment was offered immediately in 4 patients due to extensive local disease in the presence of high-risk factors and subsequently in eight patients who did not respond appropriately to medical management alone.

Indications for delayed surgical management were significantly renal or perirenal collections with rising serum creatinine , and uncontrolled sepsis after 72 h of medical treatment. All three patients having shock thrombocytopenia , and altered sensorium together died.

IV. Discussion:

Pathogenesis of EPN is under evaluation. Four key factors have been proposed including uncontrolled tissue glucose level,favouring bacterial growth, renal tissue ischemia and necrosis secondary to compromised renal perfusion, immunodeficiency and diabetic neuropathy.

Our series is highlighted by female preponderance , greater severity of disease at initial presentation, a case of recurrent EPN, and EPN in renal allograft recipient. Though longer duration of DM, poor glycemic control, multi-organ dysfunction, and greater serverity of renal involvement are well known poor prognostic factors, we did not find any single clinical or lab parameter to be associated with adverse prognosis unless associated with multi-organs dysfunction.

Thrombocytopenia, acute renal failure, altered mentation, and shock are among the factors proposed by Huang and Tseng to contribute to a poor outcome. The clinical triad of shock, thrombocytopenia, and altered sensorium connoted poor survival in our series too.

Good glycemic control in diabetics, earlier diagnosis, and prompt management of urinary tract infections may prevent the development of emphysematous pyelonephritis. All patients with complicated urosepsis (especially diabetics) should be evaluated radiologically before being stared on empirical therapy.

The diagnosis is established radiologically by screening ultrasonography followed by confirmatory CT scan of patient with urosepsis who fail to improve in 48-75 Hrs of treatment. Nephrectomy is indicated

only after unsuccessful attempts to salvage the kidney even after appropriate antibiotics, PCD, or stenting of obstructed ureter.

All 28 cases were initially managed medically with broad spectrum parenteral antibiotic. 12 out of 28 cases went on to need surgical intervention

V. Conclusion

EPN is a necrotizing renal infection most commonly caused by *Escherichia coli* and *Klebsiella pneumoniae*, and characterised by the presence of gas in renal system. Diabetes mellitus, urinary obstruction and calculus serve as niduses of infection, and provide favourable niche for fulminant infection, advanced age, higher BMI, renal impairment, thrombocytopenia, altered sensorium, shock at presentation can be used as score for poor prognosis. CT scan remains the modality of choice to delineate distribution of gas, disease extension and can help to choose the treatment alternative.

Management of EPN requires multidisciplinary collaboration including hydration and electrolyte management, broad spectrum antibiotics, strict glycaemic control, effective urinary drainage and lastly may require emergency nephrectomy as salvage procedure. Despite vigorous efforts, EPN is among the few urologic infections with a significant mortality rate.

References

- [1]. Huang JJ, Tseng CC. Emphysematous pyelonephritis: clinicoradiological classification, management, prognosis, and pathogenesis. *Arch Intern Med* 2000;160:797-805.
- [2]. Shokeri AA, el-Azab M, Mohsen T, et al. Emphysematous pyelonephritis: A 15-year experience with 20 cases. *Urology* 1997;49:343-6.
- [3]. Somani BK, Nabi G, Thorep P. Percutaneous drainage: the new gold standard in the management of emphysematous pyelonephritis? Evidence from a systematic review. *J Urol* 2008;113:1844-9.
- [4]. Hooton T. Urinary tract infections in adults. In: Jurgent F, Johnson RJ, Feehally J, editors. *Comprehensive Clinical Nephrology* 4th. Philadelphia: Mosby Elsevier Inc; 2010. p. 638-9.
- [5]. Falagas ME, Alexiou VG, Giannopoulou KP, Siempos IL. Risk factors for mortality in patients with emphysematous pyelonephritis: A meta-analysis. *J Urol* 2007;178:880-5.
- [6]. Pontin AR, Barnes RD. Current management of emphysematous pyelonephritis. *Nat Rev Urol* 2009;6:272-9.
- [7]. Kappor R, Muruganandham K, Gulia AK, Single M, Agrawal S, Mandhani A, et al. Predictive factors for mortality and need for nephrectomy in patients with emphysematous pyelonephritis. *BJU Int* 2010;105:986-.
- [8]. Geerlings SE, Stolk RP, Camps MJ, Netten PM, Hoekstra JB, Bouter KP, et al. Asymptomatic bacteriuria may be considered a complication in women with diabetes. *Diabetes Mellitus Women Asymptomatic Bacteriuria Utrecht Study Group*. *Diabetes Care* 2000;23:744-9.
- [9]. Stapleton A. Urinary tract infections in patient with diabetes. *Am J Med* 2002;113:80-4.

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