Original Research Article

Varied etiology of ARF among patients attending teaching hospital: Descriptive clinical study

Raghukanth Reddy G[1], Shivaputrappa Ghanti[2*]

[1]Assistant Professor, Department of General Medicine, Raichur Institute of Medical sciences, Raichur, Karnataka
[2]Senior Resident, Department of General Medicine, Oxford Medical college, Bangalore, Karnataka
Email: raghukanth45@gmail.com

Abstract

Over the past decade, the term Acute Kidney Injury (AKI) had replaced the older term Acute Renal Failure (ARF). The term ARF suggests a dichotomous relationship between normal kidney function and overt organ failure; in contrast, the term AKI attempts to encompass the growing body of data associating small acute and transient decrements in kidney function with serious adverse outcomes. All the study subjects were followed up on daily basis, till discharge, death or return of their renal function to baseline. Socio-Demographic, biochemical and clinical profiles of all patients were recorded. Malaria was found positive in 11 patients (10.6%), while Leptospirosis in 3(2.9%) patients and Dengue in 13(12.5%) patients. Blood culture for Staph. pseudomonas and E.coli was found positive in 5,2 and 1 patients respectively. Abnormal echo findings were observed in 7.7% patients.

Key Word: Acute Kidney Injury, E.coli, ARF

[*]**Address for Correspondence:**
Dr. Shivaputrappa Ghanti, Senior Resident, Department of General Medicine, Oxford Medical college, Bangalore, Karnataka
Email: raghukanth45@gmail.com
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INTRODUCTION

Acute renal failure is sudden and sustained decrease in the Glomerular Filtration Rate (GFR) occurring over a period of hours to days and resulting in the failure of kidney to excrete nitrogenous waste products and maintain fluid and electrolytes homeostasis.[1] Depending on the severity and duration of the renal dysfunction, this accumulation is accompanied by metabolic disturbances, such as metabolic acidosis and hyperkalemia, changes in body fluid balance, and effects on many other organ systems. ARF range from severe (that is requiring dialysis) to slight increase in serum creatinine concentration.[1] Recent evidences has shown that relatively small changes in renal function are associated with substantial increase in mortality.[2,3] Over the past decade, the term Acute Kidney Injury (AKI) had replaced the older term Acute Renal Failure (ARF). The term ARF suggests a dichotomous relationship between normal kidney function and overt organ failure; in contrast, the term AKI attempts to encompass the growing body of data associating small acute and transient decrements in kidney function with serious adverse outcomes.[4] In May 2004, a new classification, the ‘’RIFLE” (Risk, Injury, Failure, Loss of kidney function and End stage kidney disease) classification, was proposed by the Acute Dialysis and Quality Initiative Group (ADQI) in order to define and stratify the severity of AKI.[5] Three years later in March 2007, the Acute Kidney Injury Network (AKIN) classification, a modified version of the RIFLE was released in order to increase the sensitivity and specificity of AKI diagnosis.[6] Unfortunately, despite major advances in management of acute renal failure, the mortality in these patients is still high due to severe underlying illnesses and complications. It is rare for a patient to die

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directly as a result of renal failure, but ARF is an independent risk factor for death. Factors other than loss of renal function probably determine the outcome and their identification is necessary to improve the prognosis of AKI.[7-10] The burden of AKI is most significant in developing countries due to limited resources for the care of the patients, once the disease has progressed to kidney failure necessitating Renal Replacement Therapy (RRT)[11]. AKI is common, harmful, treatable and largely preventable but there are very few studies available on this subject from India using various serum creatinine values.[12,13] Hence we carried out this study to look into the varied etiology of AKI.

METHODOLOGY

All the study subjects were followed up on daily basis, till discharge, death or return of their renal function to baseline. Socio-Demographic, biochemical and clinical profiles of all patients were recorded. Variables assessed were: age, sex, type of primary disease (medical or surgical), type of AKI (pre-renal/renal/post-renal), risk factors, indications and type of dialysis and outcomes (recovery/death/discharge on dialysis).

Data Analysis: Association between qualitative variables was done with the help of Chi-square test. P value <0.05 was taken as significant. Quantitative data was represented using Mean±SD and median and Interquartile range (IQR).

INVESTIGATIONS

The following investigations were done (as and when required)

1. Complete urine examination, 24 hour urine protein estimation, urine albumin.
2. Biochemical tests including
3. Complete hematological tests including coagulation profile,
4. Bacterial and fungal (in patients with indication) cultures of blood, urine, venous catheters, and endotracheal secretions.
5. Radiological tests include x-ray of chest and abdomen and ultrasonography/computer tomography (CT) of abdomen and pelvis.
6. HIV, HBs Ag, HCV
7. Ophthalmology- Fundoscopy
8. Renal biopsy
9. ABG

RESULTS

In this study there were 96 (92.3%) of patients due to medical causes. Out of this 33 (31.7%) due to Gastroentiritis, 18(17.3%) due to UTI, 13(12.5%) due to VHF. Other causes were malaria 10(9.6%), CCF 7(6.7%),Pneumonia 5(4.8%), Leptospirosis3(2.9%), Pyelonephritis 3(2.9%), Snake Bite 2(1.9%), NSAID induced AKI and Diabetic ketoacidosis 1(1.0%) each.8 patients (7.7%), were of medico-surgical cases out of this 5(4.8%) cases were of cellulitis, 2(1.9%) were of obstructive-uropathy and 1(1.0%) were perforation.

Table 1: Distribution based on Etiology

ETIOLOGY	No. of cases	Percent
Medical	96	92.3
CCF	7	6.7
Diabetic ketoacidosis	1	1.0
Gastroentritis	33	31.7
Leptospirosis	3	2.9
Malaria	10	9.6
NSAID induced AKI	1	1.0
Pneumonia	5	4.8
Pyelonephritis	3	2.9
Snake bite	2	1.9
UTI	18	17.3
VHF	13	12.5
Medico-surgical	**8**	**7.7**
Cellulitis	5	4.8
Obstructive uropathy	2	1.9
post Iscsileal perforation	1	1.0
Total	**104**	**100.0**

Malaria was found positive in 11 patients (10.6%), while Leptospirosis in 3(2.9%) patients and Dengue in 13(12.5%) patients. Blood culture for Staph. pseudomonas and E.coli was found positive in 5,2 and 1 patients respectively.

Table 2: Distribution based on Investigation Findings

Investigation Findings		No of cases	%
Malaria	**Yes**	11	10.6%
	P. Vivax	4	3.8%
	P. Falci	7	6.7%
Dengue	**No**	91	87.5%
	Yes	13	12.5%
Lepto	**No**	101	97.1%
Blood Culture	**Yes**	3	2.9%
	Not done/ Negative	96	92.3%
	Staph.	5	4.8%
	Pseudomonas	2	1.9%
	E. Coli	1	1.0%
	Not done/ Negative	85	81.7%
Urine Culture	**Staph.**	8	7.7%
	Pseudomonas	2	1.9%
	E. Coli	7	6.7%
	Klebsiella	2	1.9%

ARDS was observed in 8(7.7%) while pulmonary oedema in 6 (5.8%) patients. Abnormal echo findings were observed in 8(7.7%) patients.

Table 3: Distribution based on Radiological Investigation

Radiological Investigation		No of cases	%
Chest X-Ray	Normal	87	83.7%
	ARDS	8	7.7%
	Pul. Oedema	6	5.8%
Echo	Normal	96	92.3%
	Abnormal	8	7.7%

DISCUSSION

Imaging of the urinary tract with renal ultrasound or CT should be undertaken to investigate obstruction in individuals with AKI unless an alternate diagnosis is apparent. Findings of obstruction include dilation of the collecting system and hydroureteronephrosis. Obstruction can be present without radiologic abnormalities in the setting of volume depletion, retroperitoneal fibrosis, encasement with tumor, and also early in the course of obstruction. Imaging may also provide additional helpful information about kidney size and echogenicity to assist in the distinction between acute versus CKD. Large kidneys observed in these studies suggest the possibility of diabetic nephropathy, HIV-associated nephropathy, infiltrative diseases, or occasionally acute interstitial nephritis. In present study deranged LFT was observed in 16.3% patients of Acute Kidney Injury. In a study by Bouchard *et al.* deranged liver functions were observed in 27% of patients with Acute Kidney Injury. Most common etiology for AKI was gastroenteritis (31.7%) and UTI (17.3%) followed by Dengue (12.5), Malaria(9.6) and CCF (7.7% each). Other diagnosis included pneumonia(4.8%), cellulitis(4.8%), lepto(2.9%), pyelonephritis (2.9%), snake bite(1.9%), obstructive uropathy(1,9%), Diabetic ketoacidosis(1%),NSAID induced AKI (1%) and perforation(1%). In present study out of total patients, 44 (42.3% %) had FAILURE stage of AKI, while 32 (30.8 %) had INJURY stage of AKI and 28(26.9) had RISK according to RIFLE staging. No gender difference was observed in the distribution of patients according to AKI stage. in the study. Commonly noted co morbidities in our patients were Type 2 diabetes mellitus, hypertension and coronary artery disease of which diabetes was predominant (14.38%). However the association was not statistically significant with regard to outcome. Mehta RL *et al*[14]in the PICARD experience, have reported an incidence of comorbidity in excess of 30%.J Prakash *et al* noted comorbidity in 52.17%[15]. In our study, AKI due to medical causes was contributory in 94.18%. The remaining 5.82% was contributed by surgical causes. J Prakash *et al*[15]showed results of 71.7% due to medical causes, 23.9% due to surgical cause and 4.3% due to obstetrical causes. According to Cenzig *et al*[16] 59% had medical causes, 25% had surgical cause and 16% had obstetric cause contributing to ARF. The overall mortality in our study was 13.5% of which mortality in the medical group was 12.54% and the remaining 0.96% was contributed by medico-surgical group. According to the study done by Kennedy *et al*[17], mortality in medical group was 24%, medico-surgical group was 28.5% and in obstetric was 1%. Incidence of prerenal failure was less in our study as most of the patients who presented to us had already progressed to acute tubular necrosis. The percentage of 81prerenal, intrinsic renal and post renal AKI was 38%, 60% and 2% respectively and mortality in the prerenal and intrinsic renal groups being 20% and 10% with no mortality in the postrenal AKI group. According to Mehta *et al*[18], prerenal ARF was seen in 50% of patients, 48% had intrinsic renal failure and 2% had postrenal ARF. Kaufman *et al*[19], showed a mortality of only 7% in prerenal AKI. The group with intrinsic renal failure had the highest mortality of 55%. In our study hypotension was the predominant presenting features which was seen in 30.7% of the patients followed by metabolic acidosis- 20.2%, encephalopathy was seen in 13.5%, oliguria in 19.3% and fluid overload was seen in 6.7%. J Prakash *et al* noted hypotension, altered sensorium and respiratory distress as the commonest features in the ICU. 65% of patients were oliguric and 36.9% of patients had evidence of fluid overload. Similarly, Mehta *et al*, in Spectrum of ARF in ICU: The PICARD experience, 2004 have noted hypotension in 20% of patients as the presenting feature which is comparable to that in our study In our study sepsis (33%) and MODS (10.6%) were the main complications. Highest mortality was found in patients with sepsis 9 patients. Patients with MODS were 8 patients J Prakash *et al*[15], reported evidence of sepsis in 69.2% patients and mortality of 84%. MODS was noted in 63% of cases and 83% of those had mortality. An S. De Vriese *et al* reported that mortality was higher in patients with septic ARF (74.5%) than in those whose renal failure did not result from sepsis (45.2%). In the study done by Marlies Ostermann *et al*, the incidence of MODS of patients in ICU was 23.1% with an overall mortality of 78.85%. In our study, out of 104 patients, 96(92.3%) had conservative line of management and 8(7.7%) underwent haemodialysis, J Prakash *et al* showed mortality of 80% in dialysed group and 42% in non-dialysed group. Metcalfe *et al* in his study showed 73.5% of patients receiving RRT for ARF expired. This seems to be due to confounding effects of severity of underlying disease process, sepsis.

CONCLUSION

- Most common etiology for AKI was medical causes with 96 patients, out of which Gastroentiritis were 33

(31.7%),UTI18(17.3%),VHF13(12.5%),malaria10(9.6%),CCF7(6.7%),Pneumonia5(4.8%), eptospirosis3(2.9%), Pyelonephritis 3(2.9%), Snake Bite 2(1.9%), NSAID induced AKI and Diabetic ketoacidosis 1(1.0%) each.

- 8 patients (7.7%), were of medico-surgical cases out of this 5(4.8%) cases were of cellulitis, 2(1.9%) were of obstructive-uropathy and 1(1.0%) were perforation.

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