



SPECTRUM OF ACUTE KIDNEY INJURY IN AN INDUSTRIAL HOSPITAL IN EASTERN INDIA – STUDY OF 300 CASES

Nibedita Mishra

13, Hill View Road, Northern Town, Jamshedpur, PIN 831001, INDIA

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ABSTRACT

Context: An understanding of epidemiology of AKI is necessary in order to establish its over all burden. **Aims:** To study aetiology and prognostic markers to improve survival and to plan potential preventive strategies in the management of AKI. **Settings and Design:** Secondary care hospital, retrospective analysis. **Methods and Material:** Case record analysis done in 300 consecutive cases of AKI admitted to Tata Main Hospital from January 2013 to February 2014. Statistical analysis used: Odds Ratio and Relative Risk. **Results:** AKI involves relatively younger and healthy individuals with mean age of 44.5 years. The commonest cause of AKI was medical diseases (75%), followed by surgical (20%), and obstetric cases (5%). Amongst the medical causes, commonest was Falciparum malaria (36%), followed by acute diarrhoeal diseases (33.3%) and Sepsis (13.3%). Amongst the surgical causes, commonest was acute pancreatitis (33.3%), followed by obstructive uropathy (17%), burn injury (16.6%), abdominal sepsis (11.7%) and poly-trauma (11.6%). Overall mortality of AKI was 20%. Bad prognostic markers were multi-organ failure (≥ 4 organ), surgical AKI and oliguria, associated with higher mortality. Favourable prognostic markers were medical causes of AKI, non-oliguric AKI and up to 3 organ failure. **Conclusions:** Acute Kidney Injury is largely a preventable and community acquired condition, sepsis being the main contributory factor. It is associated with increased LOS, increased risk of death, increased cost to hospital, and mortality rate of $>50\%$ in critically ill.

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INTRODUCTION

AKI previously known as ARF is characterised by sudden impairment of kidney function, resulting in retention of nitrogenous and other waste products normally cleared by the kidneys. AKI is not a single disease but a disastrous complication of several heterogeneous groups of diseases. AKI is present in five to seven per cent of hospital admissions and 30% of admissions to Intensive Care Unit [Liu K D,2008]. An understanding of the epidemiology of AKI is necessary to establish its overall burden on the health care provider, plan potential preventive strategies and study poor prognostic markers to improve the outcome. Renal care in India has seen impressive advancements in the last few decades. Despite improvements in diagnostic and therapeutic facilities the mortality remains unchanged. [Xue J L,2006 YMPA YP,2005]

SUBJECTS AND METHODS

A retrospective study was done of 300 consecutive cases of Acute Kidney Injury (AKI) admitted to Tata Main Hospital from January 2014 to February 2015. The patients who were previously healthy & developed AKI due to acute illness were included in the study. Those with pre-existing renal disease and long standing hypertension (HTN), type II diabetes

mellitus (DM) were excluded. All patients were studied with regards to history, physical examination, laboratory parameters, ultrasonography findings and treatment outcome. They were staged as per kidney disease improving global outcomes (KDIGO) guidelines and mortality analysis was done with respect to various prognostic factors.

RESULTS

A total of 300 cases that satisfied the inclusion criteria were included in the study. There were 67 patients in 15 to 30 years age group while 63 were in 31 to 40 years, 70 in 41 to 50 years, 58 in 51 to 60 years, 40 in 61 to 70 years and 2 above 70 years age group. The mean age was 44.5 years. Males were 66.3% and 33.7% were female. Majority were of paying category i.e. 55% and 45% were entitled cases. Most of the cases were oliguric (90%), only 10% had nonoliguric AKI. Nonoliguric AKI had a better prognosis (no mortality as compared to 22.2% in oliguric AKI). 82% of patients were in KDIGO stage III and 18% in stage II. Nineteen patients did not require hemodialysis in spite of being in stage III. Commonest cause of AKI was medical causes (75%), followed by surgical (20%) and obstetric (5%). Amongst the medical causes falciparum malaria was the commonest (36%) followed by acute diarrheal diseases (33.3%), sepsis (13.3%), pneumonia

(7.5%). Among the surgical causes commonest was pancreatitis (33.3%), followed by obstructive uropathy (17%), burn injury (16.6%), acute abdomen (11.7%), polytrauma (11.6%) and others (13.2%) including scrotal cellulitis, gluteal abscess etc. Pregnancy related AKI was the least common group out of which postpartum hemorrhage was 40%, intrauterine death was 20% and post lower section caesarian section (LSCS) sepsis, septic abortion, eclampsia, each were 13.3%.

Dialysis support was needed in most of the cases (77.3%). An average of 3.15 numbers of hemodialyses was required per patient. The length of stay was maximum in surgical cases (13.9 days), followed by obstetric cases (13.4 days) and medical cases (9.8 days). Average hospital stay was 12.3 days (Table 1). Intensive care unit (ICU) care was needed in 65 cases, while 14 cases were managed in surgical high dependency unit (HDU). Patients were discharged as per doctor's advice in 59% cases, 21% took discharge on request or against medical advice for various reasons while 20% cases met a fatal end.

Table 1 Clinical Course

Mean Age	44.5 years (minimum 17 years, maximum 71 years)
Average hospital stay	12.3 days (maximum 60 days)
Average serum creatinine	7.8 mg/dl (Maximum 21.7mg/dl)
Total patients requiring haemodialysis	232 (77.3%)
Average number of haemodialysis	3.15 (maximum 10)
AKI stage 3 not requiring haemodialysis	19

Mortality analysis was done as per aetiological factors, number of organs involved (Multisystem organ failure-MSOF Criteria) [Hebert P C, 1993] and few other factors. Overall mortality was 20% but it was highest in surgical cases (43.3%) followed by 14.2% in medical cases and 13.3% in obstetric cases. Amongst the various etiological factors, burn injury had the highest mortality (100%) followed by acute pancreatitis and polytrauma (50% each) as compared to 17.2% mortality in falciparum malaria and lowest mortality of 2.6% in acute diarrheal diseases. Multiorgan involvement was calculated using the MSOF scoring system. Renal plus one organ involvement was found in 31% cases which had only 3.2% mortality. Renal plus two organ involvement was found in 30.33% cases with 15.3% mortality. Renal plus three organ involvement showed 64.7% mortality and renal plus four organ involvements was 80.7% fatal. 60% of patients requiring intensive care expired. Oliguric renal failure had a higher mortality than nonoliguric cases.

Poor prognostic markers were presence of multiorgan failure (more than 3 organ involvement), surgical causes of AKI, acute burn injury, acute pancreatitis and oliguria whereas

Table 2 Prognostic Indicators

Indicators	Survivor	Mortality	RR	OR	Prognosis
Burns(n=10)	0%(0)	100%(10)	6.8	-	poor
Acute Pancreatitis(n=20)	50%(10)	50%(10)	2.8	5	poor
Sepsis with >3 organ involvement(n=60)	28.3%(17)	71.6%(43)	10.18	33.2	poor
Plasmodium falciparum malaria with MODS(n=81)	82.8%(67)	17.2%(14)	0.99	0.99	better
Diarrheal diseases(n=75)	96%(72)	4%(3)	0.18	0.12	better
Non-oliguric AKI	100%	0%	-	-	Good

medical causes of AKI, mostly falciparum malaria and diarrheal diseases, up to 3 organ involvement and non-oliguric cases were found to have a favorable prognosis (Table 2).

DISCUSSION

AKI constitutes about 5% of total hospital admissions and 30% of intensive care admissions [Liu K D, 2008]. Despite technological advancements, better understandings and diagnostic markers, the mortality in cases admitted to Intensive care still remains as high as 50-80% from various studies [Liu K D, 2008]. Data from dialysis units suggest that the condition is more common in India as compared to the west [Kaufmann J, 1991]. AKI is one of the most challenging problems faced by the clinician in the tropics. True epidemiological picture of AKI in tropics is not well understood due to late presentation and referral to tertiary care center.

In developed countries AKI is a disease of old age (72% cases are of more than 70 years) [Ashish JM, 2011]. Most of the cases are hospital acquired AKI and develop following coronary arterial bypass graft or open heart surgery, cardiogenic shock or due to iatrogenic causes like post-transplant AKI, contrast induced or nephrotoxic drugs and following industrial and road traffic accidents. Consequently their mortality rates are also very high (50-70%) [Ashish JM, 2011].

In contrast to the first world countries, developing countries like ours have a relatively younger population suffering from AKI, the mean age being 34 years, as reported by Chugh in 1998 [Chugh KS, 1998]. In our study it is 44.5 years. Infection is the major culprit causing acute tubular necrosis leading to AKI [Ashish JM, 2011], majority of the cases are community acquired infections like malaria, gastroenteritis, burns and other causes of sepsis. In our study, 97% of cases were classified as community acquired, compared to 84.3% reported by [S Kumar, 2012]. Natural medicines and herbs used by traditional healers add to the burden of AKI [Ashish JM, 2011]. The percentage of medical, surgical and obstetric causes in our study was 60%, 25%, and 15% respectively compared to other Indian studies where it is 88%, 3.9% and 9% [Ashish JM, 2011]. This pattern is slowly changing now. Surgical causes are increasing because of accidents, trauma, and major surgeries whereas obstetric cases declining due to better antenatal care and safe obstetric practices [Prasher PK, 1996]. Overall mortality rate reported by [S Kumar, 2012] was 29.2% compared to 20% in our study. Mortality with respect to number of organ systems involved was similar to the original study where less than 3 organ involvement had 20% mortality (22% in our study) and more than 3 organ involvement had 70% mortality (64 to 78% in our study). [Hebert P C, 1993]

CONCLUSION

AKI is a complication of several heterogeneous groups of diseases. Sepsis is the main contributory factor. It is associated with increased LOS, increased risk of death, increased cost to hospital, and mortality rate of >50% in critically ill. Acute Kidney Injury is largely a preventable and community acquired condition. Adherence to sepsis protocol and fluid management, proper antenatal care, safe delivery practices, health education about abuse of nephrotoxic drugs, vector control measures for prevention of malaria and prevention of water-borne diseases by community health measures will go a long way in reducing the burden of AKI.

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