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Original Research Article

A Study of Etiological Factors of Pregnancy Related Acute Kidney Injury

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ABSTRACT

Background: Pregnancy related acute kidney injury (PRAKI) contributes to 3.7% of overall acute kidney injury cases in Indian subcontinent. It is a major cause of maternal and fetal morbidity and mortality in developing countries.
Objectives: To determine the etiological factors of PRAKI and its relation with various parameters.
Methodology: A total of 50 patients with PRAKI were enrolled in this hospital based observational study. Cases were divided according to KDIGO criteria and were analysed in relation to age, parity, pregnancy status, mode of delivery, etiological factors.
Results: Aetiology was found to be multifactorial with sepsis in majority of cases (92%) and maximum cases were in the postpartum period.
Keywords: PRAKI, AKI, KDIGO

INTRODUCTION

Kidney Disease Improving Global Outcomes (KDIGO) defines acute kidney injury (AKI) as the increase in serum creatinine by ≥0.3 mg/dL (≥26.5 micromol/l) within 48 hours or increase in serum creatinine to ≥1.5 times the baseline within 7 days with urine volume < 0.5 ml/kg/h for 6 hours which may be oliguria with urine output <400ml/24hrs or anuria <100 ml/24hrs. [1] It includes a group of syndromes that primarily manifest as a rapid decline in the kidney function in association with the accumulation of nitrogenous metabolic waste products. Pregnancy Related Acute Kidney Injury (PRAKI) is defined as AKI diagnosed anytime during pregnancy or 6 weeks postpartum. [2] In the past, septic abortion was an important cause of PRAKI apart from haemorrhage, dehydration and toxaemia of pregnancy. [3]

With legalization of abortion, there is marked decline of PRAKI and related maternal death but still it is responsible for 15-20% of maternal and fetal morbidity and mortality in developing countries. Studies have shown that PRAKI remains as an important cause of maternal death [4] (9%-55%). In India, incidence has declined from 14.5%- 4.3%. Inspite of improvement in perinatal care, blood bank facilities, antibiotic prophylaxis, availability of haemostatic drugs, better uterotonics for management of obstetric hemorrhage, facilities for dialysis there are reports of maternal death even today due to obstetric AKI and hence challenge remains in its prevention.

MATERIALS AND METHODOLOGY

This was a hospital based observational study conducted in the Department of Obstetrics and Gynaecology in consultation with the Department of Nephrology, Gauhati Medical College and Hospital, Guwahati from 1st July 2017 to

30th June 2018. 50 patients including antenatal, postnatal and postabortal cases with Acute Kidney Injury with serum creatinine >1mg/dL with or without oliguria or anuria were taken up for the study. The study excluded patients with pre-existing renal disease & patients with renal replacement therapy. Cases were analysed according to the following parameters after evaluation.

RESULTS

Table 1: Age distribution of cases

Age group(yrs)	No of patients	Frequency %
18-20	12	24
20-30	33	66
30-40	5	10
Total	50	100

Cases were divided into 3 groups. Maximum patients were in the age group of 20-30 years with mean age of 24.16 ± 5.024 years.

Table 2: Distribution of cases according to parity.

Parity	No of patients	Frequency %
Multipara	31	62
Primipara	19	38
Total	50	100

According to parity distribution maximum cases were found to be in multipara group (62%).

Table 3: Distribution of cases according to pregnancy status.

Pregnancy Status	No Of Cases	Frequency
Antenatal	14	28%
Postnatal	26	52%
Postabortal	10	20%
Total	50	100%

There were 14 antenatal, 26 postnatal and 10 postabortal cases in our study. Maximum cases were in the postnatal group (52%) out of which majority i.e:18 cases (69.2%) developed AKI following LSCS and 8 cases (30.7%) following spontaneous delivery. It was seen that incidence of AKI was more following operative delivery.

Table 4: Distribution of cases according to aetiology

Aetiology	No of patients N=50	Frequency
Haemorrhage	32	64%
Sepsis	46	92%
Toxaemia of pregnancy	33	66%
Anaemia	30	60%
UTI	13	26%
h/o nephrotoxic drug intake	3	6%

92% had sepsis, 66% had toxaemia of pregnancy followed by 64% haemorrhage, 60% anaemia, 26% UTI and 6% with h/o intake of nephrotoxic drug. The etiology of AKI was found to be multifactorial with sepsis in the majority of patients. Toxaemia and anemia were present in all the cases of maternal death.

90% 0f AKI cases had oliguria while 10% was non oliguric. The PRAKI cases were divided into 3 stages according to KDIGO criteria, out of which 32% were in the stage I, 56% in stage II and 12% in stage III. 26% had Hb level <7g/dl, 56% had 7-9g/dl and 22% had Hb <10 g/dl.

In our study dialysis was done in 34% cases and 66% cases dialysis was not indicated. Regarding maternal outcomes 14% cases expired and 86% recovered and was on follow up. Out of the 7 expired cases in our study 6 cases belonged to age group of 20-40 years where all case was multipara. Mortality was seen more 71.4% among the postnatal group

Table 5: Case details.

Case no	Haemorrhage	Sepsis	Toxaemia Of Pregnancy	Anaemia	UTI	H/O Nephrotoxic Drug	Maternal outcome
1	+	+	+	+	-	-	Expired
2	+	+	+	+	-	-	Recovered
3	+	+	+	+	-	-	Recovered
4	+	+	+	+	-	-	Recovered
5	+	+	+	+	-	-	Recovered
6	+	+	+	+	-	-	Recovered
7	+	+	+	+	-	-	Recovered
8	+	+	+	+	-	-	Recovered
9	+	+	+	+	-	-	Expired
10	+	+	+	+	-	-	Recovered
11	+	+	+	+	-	-	Recovered
12	+	+	+	+	-	-	Expired

Table 5 to be continued…							
13	-	+	-	-	-	-	Recovered
14	-	+	+	-	-	-	Recovered
15	-	+	+	+	-	-	Recovered
16	-	-	+	+	-	-	Recovered
17	+	+	-	+	-	-	Recovered
18	+	+	-	+	-	-	Recovered
19	-	+	-	+	-	-	Recovered
20	+	+	-	+	-	-	Recovered
21	-	+	-	+	+	-	Recovered
22	-	+	-	-	+	-	Recovered
23	+	+	-	-	+	+	Recovered
24	+	+	+	-	+	-	Recovered
25	+	+	+	-	-	-	Recovered
26	+	+	+	-	-	-	Recovered
27	+	-	+	-	+	-	Recovered
28	-	+	-	+	+	-	Recovered
29	-	+	-	+	-	-	Recovered
30	+	+	-	+	-	-	Recovered
31	-	+	+	+	+	-	Recovered
32	-	+	+	-	-	-	Recovered
33	-	+	+	-	-	+	Recovered
34	+	+	+	+	-	-	Expired
35	-	+	+	-	-	-	Recovered
36	+	+	+	-	+	-	Recovered
37	-	+	+	-	+	-	Recovered
38	+	+	+	+	+	-	Expired
39	-	+	+	+	+	-	Recovered
40	+	+	-	+	-	-	Recovered
41	-	+	-	-	+	-	Recovered
42	+	+	-	-	-	+	Recovered
43	+	-	-	-	-	-	Recovered
44	-	+	-	-	+	-	Recovered
45	+	+	+	-	-	-	Recovered
46	+	+	+		-	-	Recovered
47	+	-	+	-	-	-	Recovered
48	+	+	+	+	-	-	Expired
49	+	+	+	+	-	-	Expired
50	+	+	-	-	-	-	Recovered
Total	32 (64%)	46 (92%)	33 (66%)	30 (60%)	13 (26%)	3 (6%)	Expired: 7 Recovered: 43

DISCUSSION

Across the developing world, PRAKI is a disease of young women. In our study 66% of patients were in the age group of 20-30 yrs which was similar to the observation by Das et al (65.85%), Arrayhani et al (73%) and Muhammad et al (46%). Majority of our patients were multipara 62% and was nearly similar to studies by Prakash et al 79.60%, Puri et al 73% and Muhammad et al 73%. Multiparity, lack of antenatal checkups and inadequate perinatal care are the major challenges in its causation.

Various studies have shown maximum cases of AKI developed during postnatal period. In our study also we found maximum incidence of AKI in postnatal group 52%, similar to studies by Das et al 63.5%, Kilari et al 75.61%, Goplani et al 72.85%, Arrayhani et al 50% and Puri et al 60%. Regarding the mode of delivery we found incidence of AKI was more in operative delivery 46% and only 17% in vaginal delivery.

Aetiology of PRAKI found to be multifactorial with sepsis being the leading cause with 92% in our study. Sepsis was the most common cause of PRAKI in most of the studies by Das et al 75%, Eeshewarpa et al 75%, Goplani et al 61.4%, Naresh et al 70.3%, Puri et al 59%. Hemorrhage occurring in antepartum and puerperium period accounts for larger proportion in our study i.e.: 64%. However 50%,55%,46% cases had hemorrhage in studies by Puri et al, Rizwan et al, Muhammad et al respectively. Toxaemia of pregnancy was reported as a contributing cause for PRAKI in studies by Das et al 39%, Puri et al 36%,

Utas et al 50%, Lutfullah et al 44%, Muhammad et al 23%. However in our study we found a higher incidence of 66% cases with toxaemia of pregnancy. The incidence of anaemia among the PRAKI patients in the study was 60%. Similar incidence was reported in the studies by Das et al 58%, a fairly lower incidence by both Puri et al by 40%.

CONCLUSION

- Pregnancy induced acute kidney injury is usually multifactorial and sepsis being the most common cause in our population.
- Volume depletion, sepsis, anaemia, hypertensive disorders are risk factors
- Mostly develops during postpartum period and more following operative delivery.
- It is preventable by identifying cases at risk, prompt volume replacement, control of sepsis, avoiding nephrotoxic drug, correction of anaemia and control of hypertension.
- Identification of cases at risk, awareness and anticipation required for early detection and initiation of treatment at the earliest can reduce mortality and morbidity.

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