

RESEARCH ARTICLE

Obstetric acute kidney injury: A retrospective study

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ABSTRACT

Objective: To study the prevalence, aetiology and prognosis of obstetric acute renal failure (ARF). **Methodology:** This retrospective study was carried out in International Hospital, Guwahati from January 2002 to December 2009. Forty one (41) cases treated during this period was referred from various centres. Cases were analysed to find out the prevalence, causative factors and prognosis in relation to aetiology, time of referral, and severity of renal failure. **Results:** Out of 2022 admitted obstetrics patients 41 patients had ARF and were referred for PPH, sepsis, shock or oligo-anuria. Majority (65.85%) patients were in the age group of 20 to 30years. Maximum cases 63.41% developed ARF during post partum period. Incidence was more following LSCS (46.34%) compared to 17.07% following vaginal birth. Aetiology was found to be multifactorial and 76.47% patients recovered with haemodialysis. Mortality rate was (5/41) 12.20%. Prognosis was found to be better in cases of early referral and worse in presence of sepsis. **Conclusion:** Obstetric ARF a problem of multifactorial aetiology, remains as an important cause of maternal death.

Keywords: Acute renal failure, pregnancy, sepsis, haemodialysis.

Obstetric ARF still remains as an important cause of maternal death. In developing countries incidence is around 4.2-15%¹. Cases of APH, PPH, sepsis, dehydration, toxaeemias of pregnancy and unsafe abortion are at risk of developing acute kidney injury (AKI) and usually it has multifactorial aetiology². Unsafe abortion was one of the main cause of obstetric ARF worldwide and particularly in developing countries³. With legalisation of abortion there was marked decline of maternal death due to pregnancy related acute renal failure (PRARF). In spite of improvement in perinatal care, blood bank facilities, antibiotic prophylaxis, facilities for dialysis there are reports of maternal death even today due to obstetric

ARF and hence challenge remains in its prevention and related mortality and morbidity. This study was carried out to find out the prevalence, aetiological factor and prognosis of obstetric acute kidney injury.

Materials and methods

It is a retrospective hospital based study on Obstetrics ARF, carried out over a period of 7 years from January 2002 to December 2009 in International Hospital, Guwahati. Altogether 2022 numbers of obstetric patients were admitted and managed during the study period. Among them 41 cases were obstetric ARF and all were referred from various centres for PPH, shock, sepsis or oligo-anuria.

Patients were selected on basis of the following

Received: 10th April 2017. **Accepted:** 10th June 2017.

Alakananda, Hajong A. Obstetric acute kidney injury: A retrospective study. The New Indian Journal of OBGYN. 2017; 4(1):54-8

criteria: 1) Urine volume <30ml/hr for 6hrs; or anuria, 2) Elevated creatinine level >1.5mg/dl.

Detailed history and clinical findings were recorded. Investigations included complete blood count, liver function test, renal function test, coagulation profile, serum electrolyte, C reactive protein, malarial parasite test if febrile, USG whole abdomen, ECG, R/E and C/S urine. Decision for dialysis was taken depending on patient's clinical condition, creatinine level and presence of oligo-anuria. Patients were analysed according to age groups, parity, gestational status and mode of delivery. Cause of ARF was evaluated in each case. Prognosis was analysed in relation to aetiology, type of ARF, serum creatinine levels and time of referral to our hospital.

Results and Observations

During the 7 years of study period, out of 2022 obstetrics patients there were 41 referred cases of obstetric ARF. Incidence of pregnancy related acute renal failure (PRARF) was 2.02% out of all obstetric cases. Maximum cases 27 (65.85%) was in the age group of 20-30 years. Out of 41 patients, 8(19.51%) were antenatal, 26(63.41%) were postnatal and 7(17.07%) were post abortal patients. Out of 8 antenatal cases 3 were in second trimester and 5 were in third trimester of pregnancy. Maximum cases ie.26 (63.41%) developed ARF in postpartum period. Out of 26 postpartum cases 19 patients had undergone LSCS and 7 patients delivered vaginally. All of them were referred postpartum. Incidence of ARF was found to be more following CS (46.34%) compared to vaginal delivery (17.07%).

Table 1: showing aetiological break-up and its relation to prognosis (N=41)

Cases	Haemorrhage	PIH	Anaemia	Sepsis	AGE	Malaria	URD	Pt. recovered
Case 1	+	+					+	+
Case 2	+	+	+	+			+	+
Case 3	+	+	+					+
Case 4		+	+	+		+		+
Case 5		+						+
Case 6			+	+				+
Case 7		+	+	+			+	+
Case 8				+				+
Case 9				+			+	+
Case 10		+	+	+			+	+
Case 11								+
Case 12			+	+		+	+	+
Case 13		+	+	+			+	+
Case 14				+			+	DOR
Case 15				+			+	+
Case 16				+				Expired
Case 17	+			+				DOR
Case 18	+	+	+					Expired
Case 19			+	+				Expired
Case 20	+	+		+				Expired
Case 21		+		+				+
Case 22						+		+
Case 23		+					+	+
Case 24			+	+			+	+
Case 25			+			+		+
Case 26			+			+		+
Case 27				+			+	+
Case 28			+	+				Expired
Case 29			+	+			+	+
Case 30		+		+				DAMA
Case 31			+	+	+			DOR
Case 32			+	+			+ ADRF	ADRF
Case 33	+		+				+	+
Case 34			+	+		+	+	+
Case 35	+			+			+	+
Case 36			+	+			+	+
Case 37	+	+	+	+				+
Case 38	+	+	+	+				+
Case 39			+	+	+		OU	+
Case 40			+	+				DOR
Case 41				+			+	+
Total	7(17.08%)	16(39.02%)	24(58.53%)	31(75.61%)	2(4.88%)	6(14.63%)	20(48.79%)	30(73.17%)

DOR=Discharge on request, DAMA= Discharge against medical advice, URD=Underlying renal disease, OU= Obstructive Uropathy

Analysing the causes of AKI it has been found to be multifactorial in each case as shown in the table 1. Sepsis was found to be the most common causative factor of obstetric ARF existing in 75.61% cases followed by anaemia 58.53%, underlying renal disease

Table 2: Showing prognosis in relation to dialysis and creatinine level

Creatinine range in (mg/dl) N=patients	No of patients dialysed, N=35			Recovered without dialysis N=3	Dialysis could not be done N=3	Total patients recovered N=30
	Recover - red N=27	Not recovered N=4	Treatment not continued, N=4			
> 0.9 to <5 (N= 13)	7	1Expired (E)	1 Discharge on request (DOR)	2	1E,1DOR	9/13 (69.2%)
>5 to <10 (N= 23)	17	1E,1ADRF	3DOR	1		18/23 (78.3%)
>10 (N = 5)	3	1E			1E	3/5 (60%)

48.79%, PIH 39.02%, haemorrhage 17.08%, malaria 14.63% and acute gastroenteritis 4.88%.

There were eight antenatal cases including three in second trimester and five in third trimester of pregnancy. Six (75 %) of them recovered, one (12.5%) expired, one discontinued treatment. There were three IUD, one abortion leading to 50% adverse fetal outcome and pregnancy continued in four of them.

Prognosis was worst among patients having sepsis as 22 (70.96%) patients with sepsis, 18 (75%) patients with anaemia and 13 (81%) patients with PIH recovered. Among the 5 cases that expired, 4 (80%) cases had sepsis. Sepsis found to be most common causative factor and a poor prognostic factor for obstetric AKI. Prognosis was not found to be related to pregnancy status as mortality was similar 12.5% (1 out of 8) in antenatal cases and 12.1% (4 out of 33) in postpartum cases. Out of 41, maximum nos 38 (92.6%) cases had oliguric renal failure and only 3 cases presented with nonoliguric AKI.

Fourteen (14) patients presented in emergency within 48hrs of detection of ARF whereas 27 of them presented after 48 hrs. Among patients referred within 48 hrs

there was no mortality and recovery was more (85.71%) compared to those reporting after 48 hrs (66.66%).

Cases were divided into 3 groups according to creatinine level: Group A > 0.9 - <5, Group B >5 - <10, and Group C >10 with 13, 23, and 5 cases respectively. Maximum cases were found in group B. Recovery in relation to creatinine level were 69.2% (9/13), 78.3%(18/23), 60%(3/5) in group A,B,C respectively having maximum recovery in group B (>5 - <10 creatinine). Hence recovery was not found to be related to severity of renal failure.

Out of 41 cases 31 cases completed treatment, 4 discontinued treatment, 3 recovered without dialysis and dialysis could not be done in 3. Among dialysed cases 87.09% (27/31) fully recovered and mortality was 9.6% (3/31) but mortality was 66.6 % (2/3) in whom dialysis could not be done because of poor clinical condition due to late referral.

Discussion

Table 3: Incidence of PRARF by different authors

Authors	Period	PRA - RF	Total AKI	Obstetr -ic cases	PRARF /ARF	PRARF/total preg. Cases
Rubina et al ⁴	Jan1990-dec2014	1441			25.62%	
Lutfullah et al ⁵	1997-2001	36	283		12.7%	
Kilari et al ³	Jul 1999-dec 2004	41	966		4.24%	
Goplani et al ⁶	2006	70	772		9.06%	
Ansari et al ⁷	Nov 2004-oct 2005	42	116		36%	
Irfana et al ⁸	Aug 2007-july2008	43	130		33.76%	
Rizwan et al ⁹	Oct 2009-sep 2010	35		3285		1.065%
Arrayhani et al ¹⁰	Feb 2011-jan 2012	37		5600		0.66%
Present study	Jan 2002- dec2009	41	2062	2022	1.98%	2.03%

Incidence of PRARF was found to be 2.03% of total obstetric patients and 1.98% of total ARF patients. Wide variation of incidence observed in different studies may be related to lack of uniformity in health

Table 4. Showing declining incidence in Indian scenario

Author	Year	Total PRARF	PRARF/ARF
Chug et al ²	1987	46	14.5%
Prakash et al ¹	1995	59	13.9%
Rani et al ¹¹	2002	82	12.2%
Kilari et al ³	2005	41	4.3%
Goplani et al ⁶	2008	70	9.06%
Present study		41	1.98 %

care delivery system (table 3). In the Indian scenario incidence is declining from 1987 (table 4). The present study findings indicate improvement of health care delivery system. Maximum number of patients (65.85%) was in the age group of 20-30years similar to

Table 5: PRARF in relation to gestational status in different studies

Study	Antenatal	Puerperium	Postabortal
Kilari et al ³	17.07%	75.61%	9.76%
Irfana et al ⁸	16.3%	83.7%	
Goplani et al ⁶	7.14%	72.85%	20%
Arrayhani et al ¹⁰	61.1%	22.2 %	18.9%
Lutfullah et al ⁵			14%
Present study	19.51%	63.41%	17.07%

reported by Arrayhani et al¹⁰ i.e. 73% at 22yrs. Mean age of patients reported by Kilari et al³ 26.2 years, Irfana Hassan et al⁸ as 25 +/- 6.1year, Goplani et al⁶ 25.6 years and Mohammad Ansari et al⁷ 28years, Lutfullah et al⁵ 30-40 yrs (61.1%), Rizwan et al⁹ 30-35yrs.

Etiology was found to be multifactorial including sepsis in 75.61%, anemia in 58.53%, PIH in 39.02%, hemorrhage in 17.07% cases. Similarly Kilari et al³ observed puerperal sepsis as the most common cause of PRARF including 19.51% following CS, 9.76% following vaginal delivery and septic abortion each.

Utas et al¹² reported eclampsia 50%, HELLP syndrome 15.7%, PPH 14.3%, septic abortion in 11.4% cases. Selcuk et al¹³ found abortion in 30% and PPH in 15% cases of PRARF. Rizwan et al⁹ reported PPH 31.42%, APH 25.71%, eclampsia 17.14%, DIC 14.28% and sepsis in 11.42% of PRARF. Arrayhani et al¹⁰ observed hypertension in 55.6%cases. Sepsis, hemorrhage and PIH are found to be common causative factors in all the studies. According to Lutfullah et al⁵ HELLP syndrome was the most common cause of PRARF 44%.

Maximum cases 92.68% had oligo-anuria similar to the observation by Irfana et al⁸ (18.6% anuric, 76.7% oliguric), Goplani et al⁶ (35.71% anuric, 62.85% oliguric), Lutfullah et al⁵ (100% oliguric), Ansari et al⁷ (45% anuric,55% oliguric) and Rubina et al⁴ (42.84% anuric, 50.88% oliguric). Non-oliguric AKI was 7.31% which was more than reported by Irfana et al⁸ 4.6% and Goplani et al⁶ 1.4%.

As shown in the table 5, in most of the studies maximum patients developed AKI in the postpartum period except Arrayhani et al¹⁰ who observed more in antenatal cases. We observed more cases of AKI following LSCS compared to vaginal delivery and this observation was not similar to other studies which may be due to multifactorial aeiology of PRAKI and variation in the incidence of CS in different centres due to different protocol (table 6). Out of 8 antenatal cases 75% recovered, 12.5% maternal death but fetal loss was 50%. No such parameters obtained from other studies for comparison. Prognosis was worst among patients having sepsis as 4 out of 5 deaths (80%) had sepsis. Patients referred within 48 hrs there was no

Table 6: Mode of delivery of postpartum cases

Study	LSCS %	Vaginal %
Kilari et al ³	36.59	36.59
Ansari et al ⁷	29	71
Lutfullah et al ⁵	48	
Arrayhani et al ¹⁰	40.5	40.5
Present study	46.34	17.07

mortality and recovery was rapid (85.71%) compared to those reporting after 48 hrs (66.66%). Recovery was not found to be related to creatinine level as maximum recovery observed (78.3%) in serum creatinine group >5 - <10 where as it was 69.2% in > 0.9 - <5 creatinine group and 60% in >10 creatinine group. Patients who completed treatment had 87.09% recovery and 9.6% mortality where as mortality was 66.6% in patients in whom dialysis could not be done due to poor clinical condition resulting from late referral. Maternal mortality was found to be 12.20% which is less than reported by Chug et al² (1987) 30%, Kilari et al³ (2005) 24.39%, Goplani et al⁶ 18.57%, Irfana et al⁸ 16.2%. Declining incidence indicates improvement in health care delivery system.

Conclusion

Obstetric AKI still remains as an important cause of maternal death and pregnancy loss. It is usually multifactorial and sepsis being the most common cause in our population. Volume depletion, sepsis, anaemia, hypertensive disorders and underlying renal disease are the risk factors. Mostly develops in the postpartum period and more following CS. It is preventable by identifying cases at risk, prompt volume replacement, control of sepsis avoiding nephrotoxic drug, correction of anaemia and control of hypertension. Challenge still remains in its prevention which is possible by anticipation and awareness being vigilant in high risk cases. Mortality and morbidity can be prevented by early detection and initiation of treatment at the earliest.

Conflict of interest: None. **Disclaimer:** Nil.

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