ORIGINAL ARTICLE

Outcome of pregnancy related acute kidney injury requiring haemodialysis in a Nigerian teaching hospital

[1]Rosamund M Akuse, [2]Istifanus B Bosan, [3]Hassana H Mohammed, [3]Helen Eno

Abstract

Background: Pregnancy related acute kidney injury (AKI) severe enough to require dialysis is now rare in developed countries but is still a significant cause of maternal mortality in many resource constrained countries. However, there is scanty information from many sub-Saharan countries about outcomes of patient who undergo haemodialysis. The aim of this study was to review the outcomes of women dialyzed for Pregnancy related AKI at Ahmadu Bello University Teaching Hospital Zaria, Nigeria.
Methods: Retrospective 5 year audit of patients dialyzed from 2008 to 2012.
Results: Eight (5.5%) of 150 women dialyzed within the period under review had Pregnancy related AKI. They presented 4 to 21 days after delivery with reduced urine output of 1 to 10 days (median 5 days). Only 3 (37.5%) of the 8 patients received antenatal care; 5 (62.5%) had severe haemorrhage, 4 (50%) had sepsis (2 post abortal), and 3 (37.5%) had eclampsia. Two patients died, one patient

regained normal renal function and another had partial recovery of renal function. The remaining 4 (50%) were dialysis dependent at discharge but could not afford more dialysis. Foetal loss was 87.5%.
Conclusion: Peripartum haemorrhage, Sepsis and Eclampsia were the factors associated with AKI and foetal loss in our patients. Delayed recognition, late presentation, and financial constraints contributed to maternal morbidity and mortality. Lack of antenatal care may have also contributed significantly. There is urgent need to increase awareness among birth attendants (medical/traditional) and the general public about the importance of monitoring urine output after delivery and referring patients early.

Keywords: Acute Kidney Injury, Pregnancy, Haemodialysis, Renal Outcome

Highland Med Res J 2013;13(2):85-89

Introduction

Acute kidney injury (AKI) describes a spectrum of damage to the kidney that varies from mild impairment to failure of kidney function[1]. Delay in making the diagnosis results in poor management, longer hospital stays, increased medical costs and high mortality[2,3]. This prompted the global kidney community to bring AKI to the attention of the world during the 2013 World Kidney Day, which is an annual global campaign to raise awareness about the importance of kidney disease[2].

AKI can occur during pregnancy and in the postpartum period following delivery or abortion[3]. Pregnancy related AKI has become rare in industrialized countries due to improved pre- and postnatal care, subsidized haemodialysis and decreased

incidence of post abortal sepsis. The percentage of pregnancy related AKI among total number of AKI cases fell from 43% in 1956 to 0.5% in 1967[3,4]. In contrast in many resource constrained countries the condition is still a major cause of maternal morbidity and mortality[3,5-7]. A conservative approach is often used in management of AKI in resource constrained countries because of the expense of renal replacement therapy (RRT)[8-11]. The commonest form of RRT in sub-Saharan Africa is haemodialysis, but little information is available about the outcome of pregnancy related AKI severe enough to require dialysis[9-13]. The aim of this study is to review the outcome, associated problems and subsequent renal function of women who had haemodialysis for pregnancy related AKI. It is hoped that the information gathered would help develop strategies which could prevent the development of the condition, improve patient care and reduce maternal mortality.

Material and Methods
Setting
Ahmadu Bello University Teaching Hospital (ABUTH), Zaria, is a 600 bed government tertiary centre situated in Kaduna state Northwestern Nigeria, 280 kilometres from Abuja, the federal capital. The hospital is the main referral centre for Kaduna and surrounding northern states. ABUTH provides

[1]Department of Paediatrics, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria; [2]Department of Medicine, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria and [3]Dialysis Unit, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria

Corresponding author
I. B. BOSAN
Department of Medicine, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria
Email: ibosan2k2@yahoo.co.uk

specialist services including obstetric and neonatal intensive care, paediatric and adult nephrological services. Patients with pregnancy related AKI are usually first seen by obstetricians who then refer them to adult nephrologists. Those needing dialysis are dialyzed in the haemodialysis unit which commenced operations in December 2005. The cost of admission, investigations and drugs is borne by patients or by the National health insurance scheme (NHIS), if the patients subscribe to the NHIS. However because NHIS does not pay for dialysis the cost haemodialysis is borne by the patients or their relatives.

Data collection
This was a retrospective audit of dialysis sessions carried out at the dialysis unit of ABUTH from 2008 to 2012. Retrieval of records of pregnant patients who developed renal failure but were not dialyzed was not successful. Thus only records of women dialyzed during the study period were analyzed. Data extracted from dialysis records and patient case notes included the demographic details of patient, obstetric history, clinical presentation, investigations, intensive care unit (ICU) admission (if any), details of interventions, maternal and fetal outcomes when last seen. Maternal outcome was recorded as - Full recovery where renal function returned to normal; Partial recovery where renal function remained impaired but did not require further dialysis; dialysis dependent where the patient still required dialysis at the time she was lost to follow up or more than 90 days from the first recognition of renal failure and Death. Causes of maternal death were based on clinical assessment as post mortem were not performed. Foetal outcome was recorded as alive, aborted, intrauterine foetal death, fresh still birth and neonatal death. Data was analyzed using SPSS version 16. Frequency distributions, means and standard deviation were calculated and cross tabulations of different variables done.

Results
Characteristics of study subjects
A total of 483 patients were dialyzed during the 5 year period. These included 150 females aged 15 years and older. Of these eight (5.3%) were dialyzed for pregnancy related AKI. The patients' ages ranged from 18 to 35 years (median 24 years). Six (75%) women were unemployed housewives or students, and one a petty trader.   The women had to pay all the expenses of their medical treatment at the point of need and some were unable to do all the investigations. Patients were on admission for periods ranging from 6 to 70 days.

Details of pregnancy and delivery
All the patients were referred to ABUTH, five (62.5%) from other towns (two from other states). They presented four to 21 days after delivery. The reason for referral was renal failure in 7(87.5%) patients and prolonged labour and eclampsia in one (12.5%). Only three (37.5%) of the eight women had received antenatal care. No patient gave a history of prior kidney disease but six (75%) experienced problems during pregnancy (haemorrhage, hypertension, diabetes and convulsions). The diabetic had stopped taking oral antiglycaemic drugs and was using herbal medication prescribed by a native practitioner. Four (50%) women had vaginal deliveries in other hospitals, one (12.5%) at home and two (25%) had early second trimester abortions. The patient referred with eclampsia underwent an emergency caesarean delivery after which she was admitted into the Intensive care unit (ICU).

Table 1. Clinical features of pregnancy related acute kidney injury at the Ahmadu Bello University Teaching Hospital

Clinical features on Presentation	Number n = 8
Oliguria	6 (75.0%)
Anuria	1(12.5%)
Body swelling	4 (50.0%)
Fever	1(12.5%).
Abdominal pain	1(12.5%)
Dysuria	1(12.5%)
Jaundice	1(12.5%)
Coma/Shock	1(12.5%)
Dehydration	1(12.5%)
Dyspnoea	1(12.5%)

Clinical picture
Table 1 shows the symptoms and signs presented by the patients. The commonest presenting complaint was oliguria (lasting one to 10 days (Median 5 days). Only one patient had anuria which had lasted six days. The majority; six (75%) experienced more than one complication of pregnancy or delivery; five (62.5%) had severe haemorrhage necessitating blood transfusion, four (50%) had sepsis and three (37.5%) had eclampsia. The patient referred with prolonged labour and eclampsia presented unconscious and in shock and developed renal failure 24 hours after emergency caesarean delivery. Five (62.5%) patients developed multi organ dysfunction, and one woman the HELLP (haemolysis, elevated liver enzyme, low platelets) syndrome. The serum creatinine levels on admission ranged 296 μmol/l to1486 μmol/l (median 620 μmol/l) and the serum urea ranged from 14 mmol/l to 53 mmol/l (median 28 mmol/l). Klebsiella

specie was isolated from the urine of two patients and staphylococcus from one. No patient had antibodies to HIV or hepatitis B or C. No renal biopsy or post mortem was done on any patient.

Table 2. Clinical details of patients haemodialysed at the Ahmadu Bello University Teaching Hospital for pregnancy related acute kidney injury

Patient	Clinical conditions	Problems during pregnancy	Duration of oligoanuria (days)	Maternal Outcome (renal function)	Foetal outcome
1	PPH Hypertension	Hypertension	7	Full recovery	Alive
2	Eclampsia (HELLP syndrome) Sepsis	Hypertension	5	Partial recovery	Neonatal death
3	Eclampsia APH	Haemorrhage	5	Died	Intra uterine fetal death
4	Septic abortion Haemorrhage (DIC)	Haemorrhage	13	Dialysis dependent	Aborted
5	Eclampsia APH +PPH	Haemorrhage Convulsions	7	Dialysis dependent	Intra uterine fetal death
6	Septic abortion		12	Dialysis dependent	Aborted
7	Diabetes hypertension PPH	Diabetes	6	Dialysis dependent Died	Fresh still birth
8	Sepsis	No information	No information		Unknown

Complications during dialysis

Patients were dialyzed two to seven days after admission being oliguric or anuric for five to 13 days. They received a total of 31 dialysis sessions (ranging from 1 to 8 per patient). Complications occurred in most; seven (87.5%) patients during 20 (64.5%) sessions. The commonest were hypertension during 10 (32.3%) sessions, hypotension two (6.5%) and convulsions two (6.5%). Other complications were haemorrhage, hypoglycaemia, restlessness, severe headache, difficult access (one session each). There was one intradialytic death (an eclamptic patient admitted into ICU).

Maternal renal function post dialysis

Of the seven patients who survived dialysis, one died while on admission because further dialysis could not be carried out due to financial constraints. Four (50%) patients were dialysis dependent at discharge and were lost to follow up. Only two patients were seen in the clinic two weeks after discharge. One had full recovery with normal renal function but was still hypertensive. The other had partial recovery but was still hypertensive. Both had received antenatal care.

Foetal outcome

Table 2 shows that two pregnancies terminated early in the second trimester and both were complicated by sepsis, two had intrauterine foetal death complicating eclampsia and haemorrage and one had fresh still birth at term. Information about the outcome of one pregnancy was not available. Only two live births were recorded and both mothers had received antenatal care. One (12.5%) infant was alive at the time of the mother's admission and the other recorded neonatal death but records of the children's Apgar score and birth weight were not available.

Discussion

The clinical course of patients with pregnancy related AKI who needed haemodialysis was stormy. The renal and patient outcomes of most of them were poor. Eclampsia, sepsis and haemorrhage were the major factors contributing to AKI in our patients. Delayed recognition of AKI, late presentation, and financial constraints all contributed to maternal and foetal deaths. Thus both medical and social factors were associated with poor maternal and foetal outcomes.

The medical causes of AKI followed the bimodal distribution described elsewhere[3]. In early pregnancy, it was associated with septic abortion while in later pregnancy, obstetric complications predominated. It has been established that most of these conditions could have been prevented or their effects minimized by effective antenatal care[14]. However, our patients were too few for any meaningful inferential statistics to prove the effect of ANC on the outcomes.

It should be noted that many patients had diminished urine output for long periods before presentation to hospital. We could not identify documented reasons for this in our patients but other researchers have documented that one of the contributing factors was lack of awareness by birth attendants about the importance of monitoring urine output with subsequent delayed referral, late presentation and high mortality[7, 15-19].

One limitation of this study was the small number of subjects which precluded analysis of the influence of age, parity and antenatal care on outcome. The reasons for the small number of dialyzed patients in this and other studies could include death of patients before reaching the unit, lack of facilities for dialysis or lack of knowledge that such facilities are available and inability to pay for them. Furthermore, the long term outcome of women could not be determined because they did not return for follow up. It is likely that those who needed chronic dialysis but could not afford it died at home. Unfortunately many patients are unable to present for follow up because of the long distances they have to travel to hospital, financial constraints and ignorance [13]. Our study considered only those referred for dialysis therefore those with less severe AKI were

completely excluded. We also had no information on the renal functions prior to pregnancy as it is known that pre existing renal impairment is an important risk factor for AKI [20].

Despite the obvious limitations, this study highlights that pregnancy related AKI may be an unrecognized but significant cause of maternal morbidity and mortality in Nigeria. That pregnancy related AKI is not uncommon is shown by several reports from various centres which reported prevalences of 2.4%, to 35% [6, 13, 17, 19]. However the true incidence of the problem is unknown. Most studies are hospital based and do not take into account the renal status of women before pregnancy (which may affect patient outcome). Uncertainty about the true incidence limits awareness and prompt management of the problem. Thus a great deal of enlightment, training and research needs to be done.

The need for subsidizing haemodialysis is also demonstrated in this report. Funding haemodialysis is a real problem in the tropics [8, 9]. Mortality and subsequent renal status is influenced by the type of medical care received[14]. In this study, only one (12.5%) woman recovered normal renal function. In centres which provide intensive dialysis higher rates of between 23%- to 87% are achieved whereas in resource constrained series many women become dialysis dependent or die [4, 13, 21-23]. The maternal mortality of 25% in this study is similar to that from other countries (26%) and some parts of Nigeria (29%)[13]. However much lower (2-15%) and higher (41.2 -66.7%) rates are recorded from other areas [7, 12].

Pregnancy related AKI can have serious consequences for mother, foetus and renal function. Outcome is affected by both medical and social factors. Efforts must be made to ensure that pregnant women have adequate access to antenatal care. However prevention must go hand in hand with improved medical facilities. Appropriate means of funding medicare including dialysis and renal care in general must be sought to ensure that those who most need the services receive whether or not they personally have the funds for it. A special fund could be set up to carter for patients needing dialysis.

References

1. Bellomo R, Ronco C, Kellum JA, Mehta RL, Palevsky P. Acute renal failure—definition, outcome measures, animal models, fluid therapy and information technology needs: the second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group. Crit Care 2004; 8:R204–R212.
2. World kidney Day 14th March 2013. Kidneys for life: Stop Acute Kidney Injury. www.worldkidneyday.org (Accessed 20th February 2013)
3. Susan Hou, Claudia Peano. Acute Renal Failure in Pregnancy. Saudi J kidney Dis Tranplant 1999; 9:261-266
4. Strata P, Besso L, Canavese C, et al. is pregnancy related acute renal failure a disappearing entity? Ren Fail 1996; 18: 575-84.
5. Beye MD, Diouf E, Kane O, et al. Intensive care management of 28 patients with severe eclampsia in a tropical African setting. Ann Fr Anesth Reanim 2003; 22:25-29.
6. Jido TA. Ecalmpsia: maternal and fetal outcome. Afr Health Sci 2012; 12: 148 - 152
7. Odum CU, Akinkugbe A. The causes of maternal deaths in eclampsia in Lagos, Nigeria. West Afr J Med. 1991; 10:371-376.
8. Bamgboye EL. Hemodialysis: Management problems in developing countries, with Nigeria as a surrogate. Kidney Int 2003; 63, S93–S95
9. Naiker S. End-stage renal disease in sub-Saharan Africa. Ethn Dis 2009; 19(Suppl 1): S1-13-15.
10. Aisien OA, Akuse JT, Omo-Aghoja LO, et al. Maternal mortality and emergency obstetric care in Benin City, South-south Nigeria. J Clin. Med. Res, 2010; 2:55-60.
11. Chijioke A, Makusidi AM, Rafiu MO. Factors influencing hemodialysis and outcome in severe acute renal failure from Ilorin, Nigeria. Saudi J Kidney Dis Transpl. 2012 ; 23:391-396.
12. Okunola OO, Ayodele OE, Adekanle AD. Acute kidney injury requiring hemodialysis in the tropics. Saudi J Kidney Dis Transpl. 2012 ; 23:1315-1319.
13. Okafor UV, Efetie RE. Critical care management of eclamptics: challenges in an African setting. Trop Doct. 2008 ; 38:11-13.
14. Ekwempu CC. The influence of antenatal care on pregnancy outcome. Trop J Obstet Gynaecol. 1988;1:67-71.
15. Okusanya BO, Okogbo FO, Momoh MM, Okogbenin SA, Abebe JO. Maternal mortality and delay: socio-demographic characteristics of maternal deaths with delay in Irrua, Nigeria. Niger J Med. 2007; 16:38-41.
16. Liaquat S, Khan A. Acute renal failure in pregnancy: one year observational study at Nephrology Department Sandeman Provincial Hospital Quetta. J Pak Med Assoc 2010;4:188-191
17. Ujah IAO , Aisien OA , Mutihir JT , Vanderjagt DJ , Glew RH, Uguru VE. Factors contributing to maternal mortality in north-central Nigeria: A seventeen-year review. Afr J Reprod Health 2005;9:27-40
18. Seedat YK. Acute renal failure among blacks and Indians in South Africa. S Afr Med 1978; l:427- 431.
19. Okogbenin SA, Eigbefoh JO, Omorogbe F, Okogbo F, Okonta PI, Ohihoin AG. Eclampsia in Irrua Specialist Teaching Hospital: a five-year review. Niger J Clin Pract. 2010;13:149-153.
20. Mehran R, Nikolsky E. Contrast induced nephropathy: definition, epidemiology and patient at risk. Kidney Int Suppl 2006; S11-15
21. Miguil M, Salmi S, Moussaid I, Benyounes R. Acute renal failure requiring haemodialysis in Obstetrics.

Nephrol Ther. 2011;7:178-181.

22. Adamu AN, Ekele BA, Ahmed Y, Mohammed BA, Isezuo SA, Abdullahpi AA. Pregnancy outcome in women with eclampsia at a tertiary centre in northern Nigeria. Afr J Med Med Sci. 2012;41:211-219.

23 Hachim K, Badahi K, Benghanem M, et al. Obstetrical acute renal failure. Experience of nephrology department, Central University Hospital Ibn Rochd, Casablanca. Nephrologie 2001; 22:29–31.