

Case Report

Acute Hemodialysis in Pregnancy - AKI with Live Fetus in Utero - A Series of Five Cases

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ABSTRACT

Hemodialysis following the delivery or death of fetus is more common scenario in management of pregnancy related AKI unlike hemodialysis in antenatal period with live fetus in utero which is a challenging task as two lives are to be salvaged.

Herein, we report the challenges we faced and the outcomes 5 cases of AKI in pregnancy with live fetus in situ that underwent hemodialysis.

Key words: AKI, hemodialysis, live fetus, pregnancy.

CASE DETAILS

TABLE 1: CLINICAL DETAILS OF ALL THE PATIENTS.

PARAMETER	PATIENT 1	PATIENT 2	PATIENT 3	PATIENT 4	PATIENT 5
Age in years	24	28	20	26	28
Gravida status	Primi	Primi	Primi	Second gravida	Second gravida
Period of gestation	30 weeks	36 weeks	24 weeks	26weeks	33weeks
Singleton/twins	Singleton	Singleton	Twins	Singleton	Singleton
S .creatinine at admission	7.1mg/dl	4.5mg/dl	4mg/dl	7.8mg/dl	5.3mg/dl
Risk factors for AKI	Sepsis,	Acute GE		Acute pyelonephritis	Obstructive nephropathy due to renal calculus in solitary functioning Kidney
Diagnosis	G1 with PRAKI due to sepsis ? HUS	G1 with acute GE- AKI Hypotension, post operative atrial fibrillation	G1 with twin gestation , severe anemia	G2 with AKI due to bilateral acute pyelonephritis	G2 with post renal AKI Obstructive nephropathy due to renal calculus in solitary functioning Kidney
Indication for HD	Severe renal insufficiency	Anuria, metabolic acidosis	Fluid overload, pulmonary edema	Severe renal insufficiency	Severe renal insufficiency
HD sessions no.	6	3	3	3	2
Maternal outcome	Partial renal recovery	Death	Good	Good	Good
Fetal outcome	Live , healthy baby at term	Live , healthy baby	Death of both twins	Live , healthy baby at term	Live preterm baby
S .creatinine at last follow up	2.4mg/dl	-	0.8mg/dl	0.8mg/dl	1.2mg/dl.

DISCUSSION

The incidence of acute kidney injury requiring renal replacement therapy in pregnancy was reported to be <1 in 10,000-15,000 pregnancies. ⁽¹⁾ Antenatal

hemodialysis with live fetus in situ is different in that two lives are to be dealt with by a team of nephrologists, fetal medicine specialists and obstetricians. There are no guidelines in the literature regarding

dialysis of such patients though the guidelines are well established for dialysis of pregnant women on maintenance hemodialysis. (2)

The major task in dialysing these patients is giving an adequate dialysis without compromising maternal and fetal hemodynamics. There is no definition for adequate dialysis in pregnant women as the adequacy in non pregnant state is not equal to adequacy in pregnant state because of enhanced creatinine clearance during pregnancy. Incremental dialysis with prescribed dialysate bicarbonate and calcium levels is suggested if the hemodynamics is stable. But these patients have low BP due to physiological state of pregnancy, ongoing metabolic acidosis and the precipitating factor like sepsis. Because of these factors, it is difficult to achieve adequate blood flows.

Patient 1 had sepsis, AKI and hemolytic anemia. She underwent 6 sessions of hemodialysis and her discharge serum creatinine was 2.6 mg/dl. Two months later, she delivered a live fetus. Her serum creatinine after delivery was 2.4mg/dl and remained the same at the end of one year. Renal biopsy could not be done after delivery as she refused to undergo the same.

Patient 2 presented with AKI due to acute gastroenteritis and anuria. Her serum creatinine was 4.5mg/dl. In view of anuria and severe metabolic acidosis; she was initiated on hemodialysis through internal jugular catheter. Since she was at 36 weeks of gestation, labor was induced after stabilisation with hemodialysis. We preferred cesarean section to induction and vaginal delivery for two reasons:

Early delivery of fetus as period of viability was crossed

Early stabilization of mother

She developed hypotension atrial fibrillation (AF) and seizures following cesarean section and she succumbed within 36 hours of surgery. Post operative AF can occur due to hypotension, volume changes and hypoxia. AF can cause death if there is

lack of myocardial remodelling. In view of hypoxia, hypotension, seizures and atrial fibrillation differential diagnosis of amniotic fluid embolism was also considered but there was no evidence of DIC.

Patient 3 is primi gravida who presented at 24 weeks of twin gestation with progressive pedal edema and shortness of breath of two days duration. There was no history of fever or history of ingestion of alternate medicine. At admission she had tachycardia, tachypnea and her BP was 90/70 mm of Hg. Her serum creatinine was 4mg/dl. In view of severe renal insufficiency and pulmonary edema, she was initiated on hemodialysis. Fluctuation in blood pressures during hemodialysis was significant that BP used to fluctuate between 80-90 mm of Hg and occasionally drop to 70 mm of Hg. After two sessions of HD she delivered dichorionic, two dead female fetuses of 750 gm each. Soon after the delivery, her BP improved to 110 mm systolic blood pressure. Twin gestation is known to be associated with increased risk of IUD, pre eclampsia, premature delivery, maternal loss and fetal loss. Cardiovascular hemodynamics in twin gestation is different from singleton in that there is increased heart rate, stroke volume, cardiac output and decreased peripheral vascular resistance. This may be the reason for low BP and inadequate blood flow during hemodialysis which after delivery, has improved dramatically. Fetal loss was thought to be due to continuous hypotension leading to maternal- fetal insufficiency.

Patient 4 presented with features suggestive of acute pyelonephritis with severe renal insufficiency. Fetus was of 26 weeks. Urine culture grew E.coli, which was treated with sensitive antibiotics. Taking all the precautions, she was given 3 sessions of hemodialysis after which renal function improved significantly. She delivered a live baby of 3.4 kg at the end of 37 weeks. Serum creatinine at the time of delivery was 0.8mg/dl. Katherine et al reported similar case of acute pyelonephritis with AKI, managed with hemodialysis in a

27 years aged woman with 22 weeks of gestation. ⁽³⁾

Patient 5 was challenging as she had solitary functioning obstructive kidney with PR-AKI She presented at 33 weeks of gestation with anuric AKI. Her serum creatinine was 5.3 mg/dl. Ultrasound showed hydronephrosis due to calculus of 1.2 cm in right kidney. Left kidney was contracted with loss of CMD. She was initiated on hemodialysis in view of severe acidosis and anuria. After first session of hemodialysis, she underwent cesarean section. Preterm baby with 1.5kg was delivered. After 2 sessions of dialysis, she improved. Serum creatinine at discharge was 1.3mg/dl and urine output was 2.5 litres. Percutaneous nephrolithotomy was done during the follow up period.

All the above cases are unique in that hemodialysis was done in cases of PRAKI with live fetus in situ. PRAKI can occur in the ante partum or post partum period. Common causes are septic abortion, abruption with DIC, postpartum sepsis. Patient 5 had solitary functioning kidney with obstruction due to calculus. As the baby reached period of viability, it was decided to terminate the pregnancy. Obstruction in solitary functioning kidney may get manifested during 2nd or 3rd trimesters of pregnancy. Urolithiasis with obstruction presenting during pregnancy is challenging. Symptomatic urolithiasis affecting pregnancy is reported to be 1 in 200 to 1 in 1500 pregnant women.

Antepartum AKI is commonly seen in patients with IUD with abruption, pre eclampsia or sepsis. By the time nephrology intervention is sought, the fetus would have been dead or alive fetus must have been delivered. It is unusual to dialyse patients with live fetus in situ.

Ante partum acute hemodialysis with live fetus is more critical as two lives are to be salvaged. Maternal safety over the fetal safety is prudent. But with the advanced technology and availability of fetal medicine services it may not be

unusual to dialyse such similar group more often than in the past.

In summary, we are reporting five cases of antenatal acute hemodialysis with live fetus in situ of which the fetal loss was seen in one case and maternal loss in one case and three cases had successful fetal and maternal outcome. Renal recovery was complete in two of three surviving mothers and was partial in one mother.

There are no definitive guidelines regarding antenatal hemodialysis with live fetus. The principles of dialysing end stage renal disease patients with pregnancy are being extrapolated to this group of AKI. It is known that uremic states in AKI and CKD are different. In cases of AKI, severe inflammatory state, presence of multi organ failure or involvement of extra renal organs, severe electrolyte disturbances often co exist. Steady state equilibrium is attained in maintenance dialysis patient, where as in patient of AKI with high urea generation rate, the concept of steady state is not applicable. Therefore, extrapolating the same guidelines followed for maintenance hemodialysis patients with pregnancy may not be applicable to the PR-AKI group of patients. Hence, it is essential to have separate guidelines for dialyzing patients with PR-AKI with live fetus in situ.

Precautions to be taken while dialysing this group are, ⁽³⁾ (extrapolated from the guidelines for pregnancy in CKD 5D)

1. Maintenance of adequate blood flows without compromising on the maternal hemodynamics
2. Maintenance of water and electrolyte balance
3. Incremental dialysis with new filters in each session, micro dosing of heparin
4. A regular fetal scan for assessment of fetal well being

For a successful outcome of pregnancy in those patients on maintenance hemodialysis, it has been well reported that an increased delivery of dialysis for an optimal level of urea, ⁽⁴⁻⁸⁾ control of

hypertension, correction of anemia ⁽⁹⁾ are essential in addition to close fetal surveillance ⁽⁶⁾ and multi disciplinary approach.

In addition, in cases of PR-AKI

1. Management of aetiology of AKI and multi organ failure is of prime concern
2. Early initiation of dialysis
3. Daily dialysis
4. Timely delivery of the fetus after the period of viability

Management of aetiology of AKI: Common causes of PR-AKI include sepsis, HUS, HELLP. Appropriate management of underlying etiology is of paramount importance as in no pregnancy AKI. Patient 5 patient had obstruction due to calculus in solitary functioning kidney. She is primigravida, conceived after a prolonged period of infertility of 12 years. As period of viability was crossed, patient was subjected to LSCS. But if a patient presents in 2nd trimester or early third trimester, urological intervention in the form of URSL should be considered. In a series, reported by over a period of 10 years there was no difference in the number and severity of complications between pregnant patients with obstruction and nonpregnant patients with obstruction. Patient 4 had severe bilateral pyelonephritis at 26 weeks of gestation. Controlling the pyelonephritis and continuing the pregnancy till the period of viability are of prime concern. Choosing the sensitive antibiotic with daily dialysis and regular fetal surveillance played apivotal role in combating the urosepsis as well as continuing the pregnancy till term.

Early initiation of dialysis: All our patients had anuria /metabolic acidosis/severe renal insufficiency. But in patients without anuria or severe renal insufficiency, we have noted in our experience of 115 cases of PR-AKI that initiation of dialysis when urine output decreases to <0.5ml/kg/hour (despite fluid challenge or a dose of diuretic) or presence of metabolic acidosis had yielded good outcome and early recovery of AKI.

Daily dialysis: Daily dialysis needs to be considered in AKI with anuria or with multi organ failure or hypercatabolic state due to underlying aetiology. We have given daily dialysis to all the patients.

Timely delivery of fetus: This is important factor especially in cases of late third trimester with live fetus in situ. An initial stabilization of AKI with dialysis support followed by delivery of fetus, if the period of viability has been crossed needs to be considered in coordination with the obstetricians. As the induction period in a case of primigravida may be beyond 24-36 hours, it may be better to take up the patient for cesarean section for the early delivery of fetus and placenta (Our personal observation is that in cases of PR-AKI in late third trimester, chances of IUD were higher with induction. Hence if there is no progress of labour after induction, an early decision for cesarean section is taken in such cases)

In our case series, all the patients were given bicarbonate dialysis with polysulfone membrane dialyser. Blood flow rates varied between 100-150ml/min and the dialysate flow was 200-300ml/min. All were given heparin free dialysis as precautionary measure. Dialysate bicarbonate and calcium were maintained at 32mmol/l, 2.5mmol/L respectively.

Points of interest in the above cases are:

1. Timely initiation of dialysis in Pregnancy-AKI patients with live fetus in situ would yield favourable outcomes.
2. Early trimester AKI, if treated appropriately, may allow further continuation of pregnancy.
3. Twin gestation with AKI may pose hemodynamic challenges during hemodialysis
4. A team approach is needed to salvage the two lives at risk.

Declaration of interest

There is no financial funding involved in the study. Both the authors declare no conflict

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