J Obstet Gynecol India Vol. 56, No. 3 : May/June 2006 Pg 219-223

ORIGINAL ARTICLE

The Journal of Obstetrics and Gynecology of India

Renal disease and pregnancy

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OBJECTIVE(S): To evaluate the fetomaternal outcome of women with renal disease and the effect of pregnancy on renal disease.

METHOD(S): Fourteen cases of renal disease were followed prospectively throughout pregnancy studying the course of pregnancy and renal disease.

RESULTS : One woman needed termination of pregnancy at 18 weeks. Hypertension and intrauterine growth retardation (IUGR) occurred in 8 out of the remaining 13 cases (61.5%), anemia in 7 (53.8%), urinary tract infection in 3 (23%), premature rupture of membranes in 2 (15.3%), prematurity in 7 (53.8%), fetal distress in 4 (30.8%), still birth in 1 (7.6%), and neonatal death in 2 (15.3%). Renal function worsened in 2 cases (15.3%). Fetomaternal complications were more in severe renal disease. Of the six women of hydronephrosis five presented with abdominal pain, which was relieved in four by positional change and in one by a ureteric stent.

CONCLUSION(S): The level of renal insufficiency is more important in predicting pregnancy outcome. Complications like hypertension, anemia, IUGR, and prematurity were seen more frequently in severe renal disease than in mild disease. Acute hydronephrosis presenting with abdominal pain is easily treatable by positional change.

Key words : renal disease, pregnancy with renal disease

Introduction

Renal disease in pregnancy is an important medical disorder resulting in worsening of renal function, and increased fetal morbidity and mortality. In the last five decades optimism in pregnancy outcome was noted with perinatal mortality declining from 100% in 1950 to 10% in 1990 [1]. The problem is that only a small number of pregnant women with renal insufficiency are treated at any one center. With advances in medical sciences women with renal disease are receiving better care with improved infant survival and pregnancy in them is no longer disastrous. Fertility is markedly reduced in women with severe renal disease and in these women the index pregnancy may represent the last opportunity for child bearing. Further evaluation of prognostic factors in renal disease in needed. This study was planned to evaluate the effect of renal disease on pregnancy and to establish whether or not renal disease deteriorates during pregnancy.

Paper received on 15/04/2005 ; accepted on 13/03/2006

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Methods

From April 2002 to April 2003 cases of acute and chronic renal disease were followed prospectively throughout pregnancy. These included women with renal failure in pregnancy needing dialysis, chronic glomerulonephritis, nephrotic syndrome, and massive hydronephrosis. These women were classified as having mild (serum creatinine < 1.5 mg/dL) moderate (serum creatinine 1.5 to 2.5 mg/dL), and severe renal disease (serum creatinine > 2.5 mg/dL). Blood urea, serum creatinine, creatinine clearance, 24-hour urinary protein, and sonography of the kidneys were done in all the women. Clinical evaluation, serial ultrasound monitoring, doppler flow studies and nonstress test (NST) were done for antepartum fetal surveillance.

Development of any antenatal complication like preeclampsia, anemia, intrauterine growth retardation (IUGR), prematurity, and neonatal outcome was noted. Chronic hypertension was diagnosed if diastolic pressure exceeded 90 mm Hg before pregnancy or before 20 weeks gestation. In women with chronic hypertension, superimposed preeclampsia was defined as increase of 30 mm Hg in systolic blood pressure and increase of 15 mm Hg in diastolic blood pressure along with proteinuria of >300mg/24 hours or increase in existing proteinuria. Anemia was defined as hemoglobin less than 10 g/dL and severe anemia as hemoglobin less than 6 g/dL. We considered worsening of renal function to be significant when serum creatinine levels increased by 30%. Prematurity was defined as spontaneous or induced delivery before 37 completed weeks of gestation. Fetal growth retardation was taken as a lag in growth by four weeks on ultrasonography. Exclusion criterion was hydronephrosis with normal renal function tests, which was considered physiological hydronephrosis of pregnancy.

Results

Obstetric history showed that in a total of 31 pregnancies in all women only 14 live births occurred (Figure 1). Out of 14 women, eight had mild renal disease (serum creatinine < 1.5 mg/dL). Three women presented with moderate disease and three with severe disease. Age and gravidity are given in Table 1. One woman came to us at 18 weeks with severe disease and was advised termination which was carried out with her consent. Hence she was excluded from futher study beyond age and gravidity. There were six women with hydronephrosis and seven had chronic renal disease; three of these required dialysis. Hypertension was the most common complication occurring in 8 or 61.5%; six of these had superimposed preeclampsia (Table 2). Iatrogenic prematurity was seen in four as pregnancy was terminated due to worsening hypertension or renal disease and obstetric problems (in two by induction of labor and in two by cesarean section). Lower segment

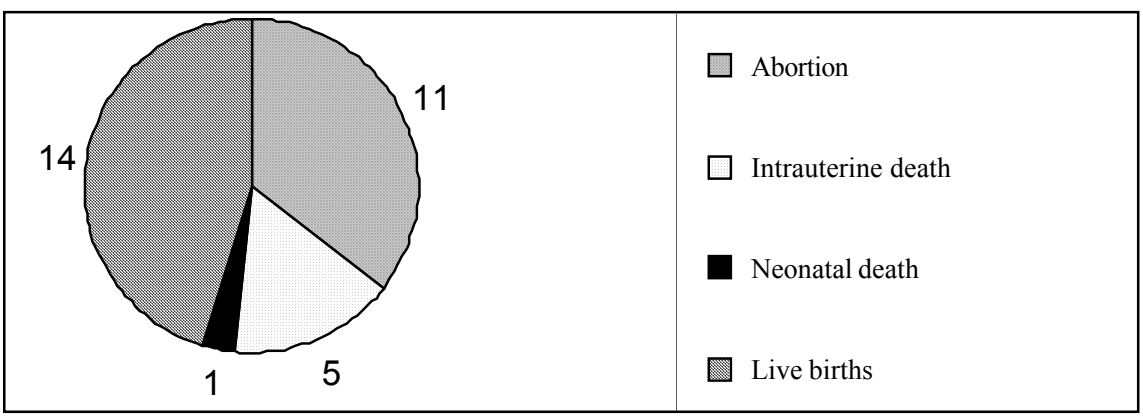

Figure 1. Past obstetric outcome.

Table 1. Age and gravidity (n=14).

	Number
Age (Years)	
20-25	2
26-30	6
31-35	3
36-40	3
Gravidity	
1	1
2	4
5	5
≥ 4	4

cesarean section (LSCS) was done in five women – two each for fetal distress and nonprogress of labor, and one for previous LSCS with an unfavourable cervix and severe hypertension. Both maternal and fetal complications were more in severe renal disease (Table 2). Mean birth weight of neonates was 2.1 kg in mild disease and 1.4 kg in severe disease. Mean gestational age of neonates was 36 weeks in mild disease and 32 weeks in severe disease.

Severe renal dysfunction requiring dialysis was present in three women. They all had severe hypertension (BP >160/110 mmHg), IUGR and severe anemia (mean Hb 5.4 g/dL). Two women with severe renal disease and superimposed preeclampsia presented with pulmonary edema. Dialysis was done 20 hours a week monitoring

Table 2. Complications (n=13) [a].

Complications	Mild disease N=8		Moderate /Severe disease n=5		Total n=13	
	Number	Percent	Number	Percent	Number	Percent
Hypertension	3	37.5	5	100	8	61.5
Intrauterine growth retardation	3	37.5	5	100	8	61.5
Anemia	3	37.5	4	80	7	53.8
Urinary tract infection	2	25	1	20	3	23
Premature rupture of membranes	1	12.5	1	20	2	15.3
Fetal distess	2	25	2	40	4	30.7
Cesarean delivery	3	37.5	2	40	5	38.5
Stillbirth	0	0	1	20	1	7.7
Neonatal death	0	0	2	40	2	15.3
Prematurity	3 [b]	37.5	4[c]	80	7	53.8
Worsening of renal disease	0	0	2	40	2	15.3

[a] Out of 14 women one needed termination at 18 weeks.
[b] Had spontaneous premature delivery.
[c] All had iatrogenic prematurity – two had induction of labor and two had cesarean delivery.

serum potassium and calcium. Ultrasonography was done for cervical length since premature labor is common. Dialysate was altered to prevent alkalosis and hypercalcemia. Water soluble vitamins were supplemented. One woman received erythropoetin for severe and refractory anemia. Despite dialysis renal function deteriorated in both the women requiring termination of pregnancy with delivery of preterm neonates both of whom died in the neonatal period. Their birth weights were 900 g and 1200 g respectively.

An interesting finding in this study was an exaggerated hydronephrosis of pregnancy. There were six women with hydronephrosis and deranged renal functions, five presented with abdominal pain and two had urinary tract infection. Renal function tests were moderately deranged in one woman – blood urea 47 mg/dL and serum creatinine 1.9 mg/dL. Mild derangement was seen in the rest (mean serum creatinine level 1.2mg/dL). Severe hydronephrosis was present in one woman, four had moderate hydronephrosis, and one had mild hydronephrosis. In five cases abdominal pain, renal function, and hydronephrosis improved markedly with a simple positional change namely bed rest in left lateral position. One woman needed a ureteric stent following which she improved significantly. Stent was removed after delivery.

Discussion

Deterioration in renal function during pregnancy was seen in 40% (2/5) women with moderate to severe renal insufficiency. Both Epstein [2] and Cunningham et al [3] found that patients with moderate to severe renal disease have accelerated renal impairment in 20 to 45% of cases. Hypertension, urinary tract infection and proteinuria were thought to have detrimental effect on renal function [4].

It was observed that hypertension, anemia, prematurity, IUGR and perinatal mortality were more in women with severe disease as compared to those in women with mild disease. In our series hypertension was found in 61.5% women and preeclampsia superimposed in 75% of them, a finding similar to Cunningham et al's [3] who reported an incidence of 62% of hypertension in women with severe renal disease, which was further complicated by preeclampsia in 80%. They found anemia in 73% but our study showed an incidence of 53.8%. In our series one woman on dialysis received erythropoetin. The safety of this drug in pregnancy is yet to be established though no teratogenicity has been reported [5]. The requirement of erythropoetin increases by 50% in pregnancy. In our series fetal survival in moderate to severe renal disease was 80% while in mild disease it was 100%. We had one still birth at 29 weeks of gestation, the baby weighing 900 g.

Okundaye et al [6] reported a survival of 70 to 100%; 70% in dialyzed women. Although all the three women on dialysis had live births two babies were lost in the neonatal period due to prematurity. In our series prematurity was present in 53.7% and was an important cause of neonatal morbidity. Hou [4] reported that in women who required dialysis the incidence of prematurity was 85% with a mean gestational age of 32.4 weeks. The mean gestational age in women on dialysis was 31 weeks in our series.

It is recommended that during pregnancy dialysis be intensified to 20 hours/week to keep blood urea nitrogen (BUN) < 25 mg/dL in order to reduce the incidence of polyhydramnios and of dialysis induced hypotension [6]. Indication for dialysis was creatinine clearance of less than 14 mL/minute/1.73 m^2 [7]. Okandaye et al [6] showed a trend towards better fetal survival with intensified dialysis. With the loss of aminoacids and water soluble vitamins in dialysate due to increased hours of dialysis the pregnant women on hemodialysis need special dietary supplements [8]. Protein intake is increased to meet the needs of pregnancy, and dialysis is increased to prevent azotemia. With intensified dialysis, adjustments have to be made in the dialysate composition. Serum potassium levels may decrease if dietary increase in potassium does not make up for increased losses in the dialysate and dialysate potassium may need to be increased. Also hypercalcemia may occur if a bath contains 3.5 mEq/L of calcium as the patient receives almost 1g of calcium with each hemodialysis treatment. The predialysis calcium level should be checked weekly. Women require 2 g of calcium orally per day if 2.5 mEq/L calcium bath is used as recommended for pregnant women. The dialysate bicarbonate of 35 mEq/L is designed to offset two days of acid production. Daily dialysis may result in excessive bicarbonate gain. Metabolic alkalosis carries an increased risk in pregnant women who also have a concurrent respiratory alkalosis. Hence 25 mEq/L of bicarbonate should be used. Care must be taken to avoid fluid overload, electrolyte imbalance, and infection. Heparin free dialysis is done only if the woman has a bleeding problem [7]. Our women were put in left lateral position to displace uterine pressure from inferior vena cava during dialysis. Since preterm labor is common, serial ultrasonography for signs of cervical shortening is necessary. Antepartum fetal surveillance should be done after viability is reached. Pregnancy should be terminated at 38 weeks. To avoid water retention a concentrated oxytocin drip should be used while inducing labor. Cesarean section is employed for obstetric indications. Infants have BUN and serum creatinine levels equal to those of the mother and should be monitored for development of volume contraction and electrolyte abnormality.

Acute hydronephrosis of pregnancy is a pathological consequence of a nonacute physiological situation with complete or severe obstruction. It presents as acute flank pain with marked hydronephrosis, with or without deranged renal function and urinary tract infection. Ekford and Gingell [9] found that the peak dilatation occurred at 24 to 28 weeks attributing it to compression of ureters at pelvic brim by lower uterine segment . It is more common in twins and in polyhydramnios with an incidence of 31% in each [10]. Fifty percent developed hydronephrosis with azotemia, which resolved after delivery. A striking manifestation of this syndrome is altered urinary output with change in position of the patient. Symptoms are relieved on lying on the opposite side of the pain or in knee chest position. In cases which do not respond, ureteric stent has to be inserted and left till puerperium [11]. This was done in one of our case. Urinary tract infection (UTI) and hypertension were present in 33.3% of our women with hydronephrosis. Satin et al [12] reported hypertension in all their three women having obstructive uropathy with pregnancy [12]. It has been postulated that hypertension in such cases may be due to sodium or water retention or may be mediated through renin. Mean gestational age at which our patients presented was 30 weeks which is similar to that reported by Ekford and Gingell [9]. All their cases presented with abdominal pain and the right ureter was involved in 77% of them. In our study there was 83% involvement of right ureter. Abdominal pain was the most common symptom of presentation in our cases with hydronephrosis. Serum creatinine concentration and ultrasonography of the kidneys should be done in women with significant risk factor for obstruction like multiple pregnancy, polyhydramnios, and renal anomalies, especially in cases with vague abdominal or back pain.

Conclusion

The level of renal insufficiency is more important than type of renal disease in predicting pregnancy outcome. Women with severe disease tend to have deterioration of the disease with poor fetomaternal outcome. Since it is necessary to intensify dialysis during pregnancy it is obligatory to make changes in the hemodialysis regimen and give dietary supplements of water soluble vitamins and proteins. LSCS is done for obstetric indications only. However because majority of women have chronic placental insufficiency decision for LSCS should be well-timed. Acute hydronephrosis must be kept in mind in cases of uncertain abdominal and back pain and a simple positional change is all that is required as treatment. An occasional woman may require a ureteric stent placement.

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