Commentary

Pregnancy in chronic kidney disease

The kidney undergoes significant anatomical and physiological changes during pregnancy. All these changes revert to normal by the end of postpartum period. There is an increase in plasma volume with hemodilutional anemia. Cardiac output, renal plasma flow, glomerular filtration rate (GFR) also show a marked increase. There is a blood pressure fall of approximately 10 mm Hg in the first 24 weeks, which gradually returns to prepregnancy level by term. Serum creatinine and uric acid levels decline. Glycosuria and aminoaciduria occur. Potassium and sodium are retained. Calcium excretion increases. A reset in the osmostat occurs, resulting in low plasma osmolality. There is mild respiratory alkalosis.[1,2] Though there is an afferent and efferent arteriolar dilatation in pregnancy, there is no increase in glomerular pressure.[3] Hence even multiple pregnancies do not affect the renal function adversely in the normal population.

Pregnancy in females with normal renal function may be associated with acute kidney injury due to pre-eclampsia, acute fatty liver, hemolytic uremic syndrome, puerperal sepsis, hyperemesis and septic abortion in normal population. The renal function generally improves postpartum in these individuals.[4-6]

Maternal outcomes

Pregnancy is unusual in females with chronic kidney disease (CKD), but when it occurs it poses a challenge both for the nephrologist and gynecologist. The number of pregnancies varies in different CKD stages with the highest number in stage 1 or 2 as shown by Singh *et al*. in this issue.[7]

Pregnancy, when it occurs in women with CKD, is considered high risk. Unlike in normal population where pregnancy has no adverse effects on renal function, in patients with underlying renal disease pregnancy may affect maternal and fetal outcomes.[8] This is because the diseased kidneys may be unable to adapt to the normal physiologic changes of pregnancy leading to perinatal complications. Physiological increase in GFR is attenuated in moderate renal impairment and does not occur if serum creatinine is more than 2.3 mg/dl.

Severity of renal disease, hypertension and proteinuria are the three major determinants of outcomes. Proteinuria greater than 1 g/day, serum creatinine more than 2 mg/dl and blood pressure more than 140/90 are poor prognostic factors. The type of disease also may be important as accelerated progression may be more likely in membranoproliferative glomerulonephritis, focal segmental glomerulosclerosis and reflux nephropathy[9] However, most investigators have found that etiology (other than lupus nephritis) is probably not a major determinant of worsening renal disease, if factored for pre-existing renal insufficiency and hypertension.[10]

In the majority of patients with mild renal function impairment, pregnancy is usually successful and does not alter the natural course of maternal renal disease provided blood pressure is normal and there is no proteinuria.[8]

Conversely, fetal outcome and long-term maternal renal function might be seriously threatened by pregnancy in women with moderate or severe renal function impairment.[9] More than one-third experience an irreversible decline in GFR and 10 percent progress to end-stage renal disease (ESRD) by 12 months postpartum.[10,11]

Pregnancy is rare when serum creatinine rises beyond 3 mg/dl as either these females have amenorrhea or have anovulatory cycles. In case if pregnancy does occur

in these women about a third will progress to ESRD in 1 year postpartum.[10]

In addition to the effect of pregnancy on renal disease, women with GFR <60 ml/min are at greater risk of developing pre-eclampsia as compared to those with GFR >60 ml/min/1.73 m^2 (12% vs. 2%).[11] Nephrotic proteinuria is common. There may be increase in maternal mortality[11] and increase in the incidence of cesarean deliveries.

Fetal outcomes

Spontaneous abortion and intrauterine growth retardation is frequent.[12] Full-term delivery is less common and stillbirth and low birth weight are higher in women with CKD stages 3 and 4. Perinatal mortality is high. Live birth rate varies with the stage of CKD and is 98% in mild renal failure and 90% in those with moderate renal failure while those with severe renal failure have 50% fetal loss.

Although there is consensus that women with CKD have a higher risk of adverse maternal and fetal outcomes compared with women without CKD, the magnitude of this risk is not clear. In addition, there is no consensus whether the increased risk is due to CKD or due to the co-morbid conditions associated with CKD, which themselves can modify the risk. Though most studies have compared maternal and fetal outcomes between women with and without CKD, there are a few studies that compare renal disease progression in women with CKD who conceive versus those who do not become pregnant. Larger studies with uniform criteria are required to quantify the risk for maternal and fetal outcomes. The authors have clearly demonstrated the effects of pregnancy on renal disease progression in patients in different stages of CKD.[7]

In view of the potential for risk, women with CKD who wish to become pregnant should have preconception counseling and antenatal care with a multidisciplinary "high-risk pregnancy" team comprising obstetrician, nephrologist and neonatologist. It is said that for a woman "To be pregnant is to be vitally alive and thoroughly woman" and such a team approach can improve chances of successful pregnancy for women with CKD.

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