Pregnancy and End Stage Renal Disease

By Rakhi Khanna

How frequent is pregnancy in ESRD? What are the current outcomes?

Fertility is reduced in dialysis patients. The reasons are multifactorial and include hormonal abnormalities, such as hyperprolactinemia and hypergonadotropic hypogonadism, anovulatory cycles, and sexual dysfunction (1). In the United States, among women of childbearing age on dialysis, frequency of pregnancy is around 0.5% per year on the basis of survey results (1). Some countries have reported up to 1.4% per year frequency rates. For reasons that are not well understood, patients on hemodialysis have a two to three times greater likelihood of conception than patients on peritoneal dialysis (2). Experts think peritoneal solution may cause interference with implantation and ovum transport.

Approximately 50% of pregnancies result in survival of infants. However, many of these infants are premature and small for gestational age. These infants can have multiple medical and developmental problems (1).

What treatment modalities are best for mother and child? When is fetal monitoring initiated?

Pregnancy requires more aggressive dialysis. This means more frequent dialysis, at least six times a week with a target BUN <45 mg/dL (3). Better outcomes are reported for infants born to pregnant women dialyzed more than 36 hours per week. Intense dialysis improves uremic and maternal volume status. Therefore, these infants have a higher live birth rate compared with those of pregnant women who were dialyzed less frequently (4). Kidney Disease Outcomes Quality Initiative guidelines also recommend long frequent dialysis. However, the standard method to calculate Splev/V cannot be used, because the equation applies to thrice weekly hemodialysis.

It is also a challenge to adjust the ultrafiltration goal and/or establish a dry weight for the patient. Elevated BP in pregnancy may not always be volume mediated and may be related to preeclampsia. Careful attention is needed to avoid hypotension, which can lead to placental hypoperfusion. Daily dialysis does help in assisting volume balance.

Frequent hemodialysis will mean very careful adjustments in potassium, calcium, and bicarbonate to avoid hypercalcemia and alkalosis (5). A regimen of daily dialysis can lead to alkalosis, and the bicarbonate bath needs to be adjusted to maintain bicarbonate levels around 20 mEq/L (1). Typical dialysate potassium of 3 mEq/L and bicarbonate concentration of 25 mEq/L are needed.

Peritoneal dialysis may be used and may also be useful in avoiding rapid metabolic changes. However, as pregnancy progresses, it can become difficult to tolerate the exchange volumes (1).

Fetal monitoring is done as per obstetric guidelines using serial ultrasonography to examine fetal growth and evaluate the placenta and amniotic fluid. Weekly fetal surveillance is started around 24 to 26 weeks using ultrasound and biophysical profile (6).

What medications are safe?

Antihypertensive medications that are safe and commonly used are methyldopa, labetalol, hydralazine, and dihydropyridine calcium channel blockers. β-blockers other than labetalol can cause fetal bradycardia. Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers are contraindicated, because they can increase the risk of major congenital malformations (7).

As patients are dialyzed more often, caution and proper medication adjustment are needed to avoid hypotension. Target postdialysis BP should be less than 140/90 mm Hg.

In terms of anticoagulation, heparin can be used in dialysis. It does not cross the placenta, and it is not teratogenic (8). Coumadin cannot be used, and patients who are on Coumadin for access-related clotting problems will have to be changed to subcutaneous heparin (9). Low molecular weight heparins, such as enoxaparin, and novel oral anticoagulants, such as rivaroxaban, dabigatran, and apixaban, are not approved for use in dialysis patients.

Calcium-based phosphorus binders are probably the safest to continue as long as calcium concentration is monitored and maintained within normal limits. Active vitamin D derivatives and vinacalcit are all category C drugs with only case reports of their use. There are not enough reports to show safety. A higher dose of folic acid (at least 5 mg/dL) is also needed during pregnancy owing to higher dosage needs and removal of water-soluble vitamins caused by intensive dialysis. The multimvitamin dose is also doubled daily.

Is anemia management different? Are there concerns regarding erythropoietin or transfusion?

Anemia, especially hemoglobin levels <8 g/dL, can have adverse effects on the fetus (2). Erythropoietic agents can be used in pregnancy, because there are no reports of teratogenicity (10). Previous studies do not show transfer of epoetin alfa (epogen) across the placenta (11). Multidose formulations containing benzyl alcohol are contraindicated, and single-dose preparations should be used. Dose requirements are 50 to 100% more for pregnant women on dialysis and can be increased right away (1). Intravenous iron preparations can be continued as well, although safety data are lacking. There are sparse reports about packed red blood cell transfusion during pregnancy; therefore, it should be used cautiously following current transfusion guidelines.

What are the postpartum issues for the mother and the baby?

The pregnant dialysis patient requires a highly specialized team, including the nephrologist, a high-risk pregnancy obstetrician, and a neonatologist. The number one issue encountered in pregnant dialysis patients is prematurity, which in turn, is the greatest cause of morbidity and mortality in the infants (1).

Other complications include preeclampsia, polyhydramnios, and premature labor. Most commonly used medicines, such as intravenous magnesium to stop preterm labor, are difficult to use, because they can lead to magnesium toxicity and cause respiratory depression (12). Timing of delivery is usually around 34 to 36 weeks, but the mean gestational age has been noted to be only 32 to 36 weeks. Infants of dialysis patients are born with BUN and creatinine levels similar to the levels of the mother. After birth, these infants can have an osmotic diuresis and develop volume contraction with metabolic alkalosis (13).

Acknowledgments

As a practicing nephrologist, I am indebted to my patients for giving me the opportunity to provide care for them and the inspiration to learn.

Suggestions

Search for this topic revealed multiple review articles but few prospective studies examining management and outcomes of pregnant dialysis patients. I recommend an ongoing registry for pregnant patients on dialysis.

References


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