Management of Acute Kidney Injury in Pregnancy for the Obstetrician

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KEYWORDS

• Acute kidney injury • Pregnancy-related acute kidney injury
• Atypical hemolytic uremic syndrome • Thrombotic microangiopathy • Preeclampsia
• Hypertensive disorders of pregnancy

KEY POINTS

- The physiologic changes in the kidney pose a challenge to the diagnosis of acute kidney injury in pregnancy.
- Assessment of baseline renal function and proteinuria early in prenatal care is essential for accurate diagnosis of pregnancy-related acute kidney injury.
- Identification of women at risk for acute kidney injury plays a crucial role in prompt diagnosis and prevention of acute kidney injury.
- Optimal management of women with pregnancy-related acute kidney injury requires a multidisciplinary team approach.
- It is prudent to limit renal biopsy to women with a suspicion of any condition that is severe enough to warrant urgent treatment or a change in management.
- The indications for starting renal replacement therapy in pregnancy-related acute kidney injury are the same as those in the nonpregnant population.

BACKGROUND

The incidence of pregnancy-related acute kidney injury (PR-AKI) varies widely across the world, with reported incidence of 1 in 20,000 pregnancies[1] to as much as 1 in 50 pregnancies.[2] Many factors contribute to this variation in incidence, such as lack of uniform defining criteria, physiologic changes in pregnancy that affect interpretation of laboratory tests, and regional differences in factors contributing to acute kidney injury (AKI). In addition, AKI (a term that has replaced acute renal failure) is often under-recognized until it is severe. Often there is a lack of information on baseline

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prepregnancy serum creatinine (SCr) values in this population, which further poses a problem. The diagnostic accuracy of the currently accepted definition of AKI in the general population is not fully known in pregnancy and perhaps is inadequate.

Some nations report a bimodal distribution with an early peak of AKI as a consequence of septic abortions and a second peak later in pregnancy from hypertensive disorders of pregnancy, along with obstetric complications such as hemorrhage. Although the etiology of PR-AKI varies based on the country of origin, in most regions, including low-income countries, preeclampsia and eclampsia account for 5% to 20% of cases, with one study reporting 36% of PR-AKI to be from hypertensive disorders of pregnancy (**Box 1**).[2] The risk of PR-AKI is higher in the setting of early-onset (<32 weeks gestation) preeclampsia. Other major causes of PR-AKI in developing countries include sepsis and severe hemorrhage, whereas primary renal disease, thrombotic microangiopathy (TMA), and acute fatty liver of pregnancy (AFLP) are more common in the developed nations. Pregnancy may also unmask underlying primary renal disease or modify the course of preexisting renal disease.

Although overall a decrease in the incidence of PR- AKI has been reported, a substantial increase in AKI during pregnancy has been reported recently in the United States and Canada, with a higher increase reported in the United States. PR-AKI was also associated with a higher mortality rate, ranging from 17.4% of deaths during delivery hospitalization to 31.5% of deaths among postpartum hospitalizations in those with AKI.[3,4] This change could be attributed to several reasons such as, an increase in testing for the condition and lowering of the threshold for diagnosis, with the older literature relying a higher decline in glomerular filtration rate (GFR) to diagnose AKI.[5,6] A potential diagnostic ascertainment bias is further supported with an increased need for renal replacement therapy (RRT) seen among pregnant women with chronic kidney disease (CKD) and chronic hypertension who develop AKI.[4] Although risk factors such as diabetes, preeclampsia, and chronic hypertension predisposing women to PR-AKI have increased, the recent study by Mehrabadi[4] found that these factors contributed little to the increase in overall acute renal failure.

Although most women with AKI in pregnancy recover renal function, up to a third do not fully recover and can have serious long-term outcomes.[2,7,8] Some may require RRT, and, when this option is unavailable (as in many parts of the world), it may result in mortality. Maternal and fetal outcomes, thus, depend on optimal management of AKI.

Following a brief overview of physiology, this article provides an in-depth review of management of the spectrum of AKI occurring in pregnancy. Significant anatomic and physiologic changes occur in the kidneys during pregnancy and some of these changes begin soon after conception. Specific attention is given to current research and the newer therapeutic options.

Anatomic changes in pregnancy

The length of the kidney increases by 1 to 1.5 cm.

The volume of the kidney increases up to 30% because of changes in the vascular and interstitial spaces.

The urinary collecting system is dilated with hydronephrosis seen in up to 80% of pregnant women.