Statement of Editorial Purpose

The Hospital Physician Urology Board Review Manual is a peer-reviewed study guide for residents and practicing physicians preparing for board examinations in urology. Each manual reviews a topic essential to the current practice of urology.

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Urologic Issues During Pregnancy

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Urologic Issues During Pregnancy

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INTRODUCTION

Pregnancy induces several unique physiologic changes in women that can greatly affect the genitourinary system. Urologists must be highly attuned to the changes that occur throughout pregnancy as well as be aware that any diagnostic or therapeutic maneuvers may impact not only the pregnant patient but also the fetus. In fact, prior to proceeding with any intervention that could be harmful to a developing fetus, any woman of child-bearing age should be considered potentially pregnant until proven otherwise. This manual discusses several urologic problems that may arise during pregnancy, including asymptomatic bacteriuria (ASB) and symptomatic urinary tract infection (UTI), urolithiasis, pregnancy after urinary diversion, and urologic malignancy, and describes the approach to the urologists’ role in their management.

PHYSIOLOGIC CHANGES DURING PREGNANCY

CASE 1 PRESENTATION

A 17-year-old gravida 1, para 0 girl at an estimated 14 weeks of gestation presents with vague abdominal discomfort and urinary frequency. Renal ultrasonography reveals bilateral hydronephrosis, which is greater on the right side as compared with the left. The patient’s serum creatinine level is 0.5 mg/dL. Urinalysis is normal. The radiologist’s interpretation of the findings is physiologic hydronephrosis of pregnancy, with no other abnormalities.

• What physiologic changes occur during pregnancy? What effects do these changes have on diagnostic and therapeutic interventions?

PHYSIOLOGIC CHANGES BY ORGAN SYSTEM

Cardiovascular

In pregnancy, the cardiovascular system becomes hyperdynamic to meet the increasing metabolic demands of the growing fetus. Cardiac output increases by 30% to 50% by the third trimester with preferential blood flow to the placenta, uterus, skin, kidneys, and mammary glands. Progesterone and prostacyclin induce vascular relaxation and decrease systemic vascular resistance. In the latter half of pregnancy (from 28 weeks' gestation to delivery), the gravid uterus may compress the great vessels, reducing arterial blood flow below the level of uterine pressure and decreasing venous return to the heart.

Hematologic

Total blood volume increases by 25% to 40% during pregnancy. However, while plasma volume increases approximately 50% by 24 to 28 weeks of gestation, the red blood cell volume increases only approximately 15%. This results in relative hemodilution and a decrease in hematocrit, or the so-called “physiologic anemia of pregnancy.” As a consequence of the hemodilution, the free fraction of protein-bound drugs increases, which can alter the drugs’ effects and toxicity.

The blood of pregnant women also becomes hypercoagulable due to: (1) an increase in factors VII, VIII, and X and fibrinogen; (2) a decrease in fibrinolytic activity; and (3) a reduction of velocity of venous blood flow in the lower extremities. These factors significantly increase the risk of venous thromboembolism in the third trimester and immediate postpartum period to 5 to 6 times greater than the risk in the nongravid woman.

Pulmonary

Pregnant women have a more rapid decline in PaO₂ than nonpregnant women due to a combination of a 20% reduction in functional residual capacity (by the fifth month of pregnancy) and a 15% increase in oxygen consumption. Therefore, the pregnant woman has a greater risk of hypoxemia during high-demand ventilation states, such as during exercise and times of stress, sepsis, and induction of and emergence from anesthesia.

Gastrointestinal

Progesterone production during pregnancy inhibits gastric and intestinal motility and relaxes the gastroesophageal sphincter. The gravid uterus also pushes the abdominal contents toward the diaphragm, which reduces the size of the gastric reservoir and may