

Renal Disease & Pregnancy



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Project Echo

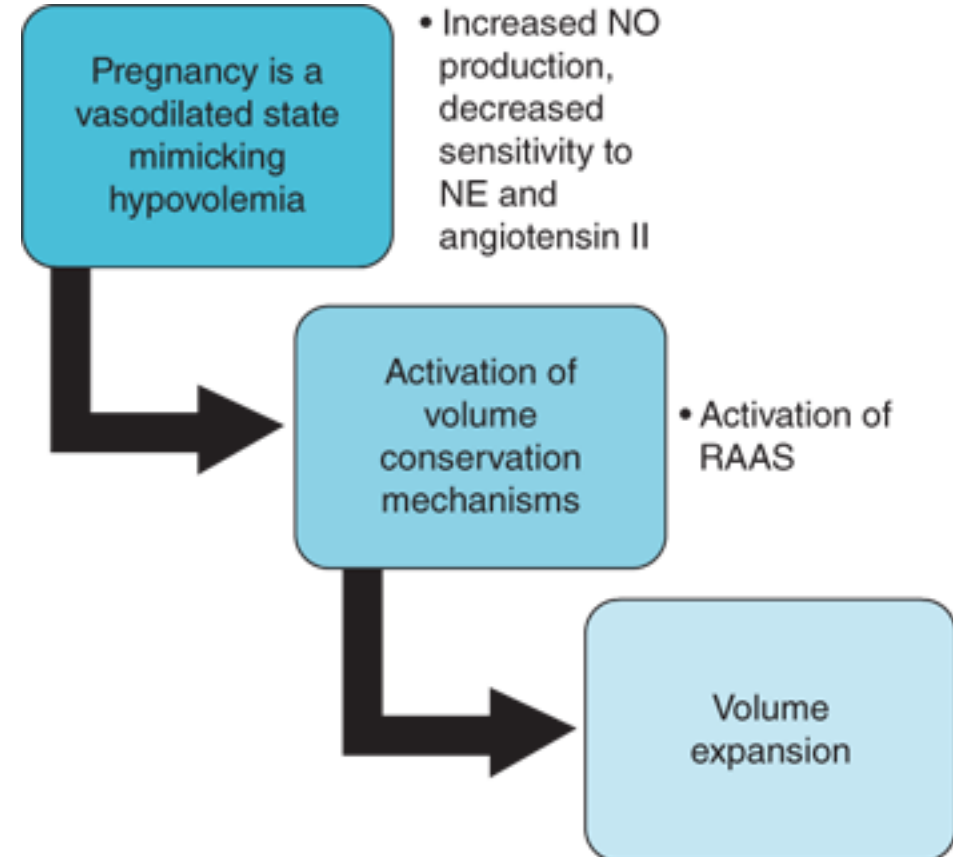
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Objectives

- Renal physiologic changes in pregnancy
- Pre-existing renal disease
- Obstetric-related renal disease
- Management principles

Physiologic Changes of Pregnancy

- Increase in blood volume through plasma volume expansion
 - Renin-angiotensin-aldosterone system stimulates sodium and water retention
- Increased cardiac output
- Decreased blood pressure



Source: A. C. Santos, J. N. Epstein, K. Chaudhuri: Obstetric Anesthesia
www.accessanesthesiology.com
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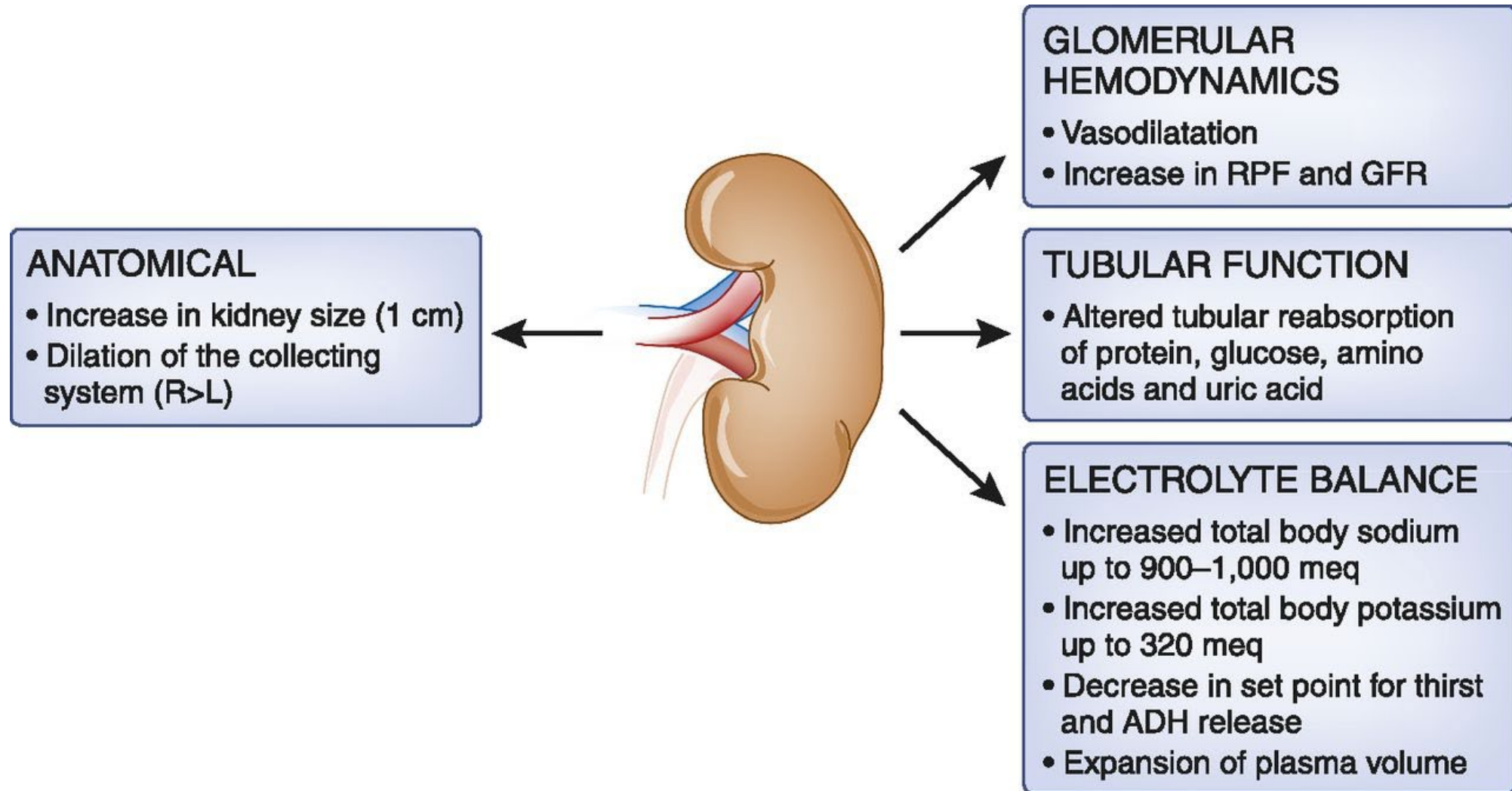
Physiologic Changes of Pregnancy

- Renal plasma flow increases 60-80%
- Increase in GFR
- Serum creatinine decreases throughout pregnancy
- Net reabsorption of sodium > volume expansion
- Volume homeostasis
 - Body weight increases by 20-35lb (2/3 body water)
 - 6-7L in extracellular space
 - 2L in intracellular space
 - 25% plasma volume – 75% interstitial space

Physiologic Changes of Pregnancy

- Kidney length increases by 1cm and volume by 30%
 - Normalizes 1 week postpartum
- Urinary tract dilation
 - 80% develop dilation of the calyces and ureter
 - More common on the right side
 - Progesterone, relaxin and nitric oxide contribute to ureteral smooth muscle relaxation
 - Collecting system and ureteral dilation may persist for 3-4 months
- Urethral length increases
- Intraurethral closure pressure increases

Physiologic Changes of Pregnancy



Renal Disease in Pregnancy

- Pre-existing renal disease
 - Chronic kidney disease
 - Diabetic nephropathy
 - Hypertensive nephropathy
 - IgA nephropathy
 - Lupus nephritis
 - Renal transplant

Renal Disease in Pregnancy

- Chronic Kidney Disease

Stage	Description	Estimated GFR
1	Kidney damage with normal or increased GFR	≥ 90
2	Kidney damage with mildly reduced GFR	60-89
3	Moderately reduced GFR	30-59
4	Severely reduced GFR	15-29
5	End-stage renal failure	<15 or dialysis

Renal Disease in Pregnancy

- Chronic Kidney Disease
 - Assessment of renal function → serum creatinine
 - Average serum Cr = 0.6
- Worsening renal function = Women with CKD who do not show a decrease in serum creatinine or show an increase

Renal Disease in Pregnancy

- Chronic Kidney Disease
 - Stage 1 and 2
- Successful pregnancies in general
- Do not have lasting renal damage from pregnancy
- Still have increased risk of preeclampsia and fetal growth restriction

Renal Disease in Pregnancy

- Chronic Kidney Disease
 - Stage 3 – 5
- Prepregnancy/first trimester Cr 1.4 or greater
 - 51%: stable GFR through pregnancy and 6mo PP
 - 8%: decline in GFR with recovery
 - 31%: decline in GFR without recovery
 - 10%: decline in GFR between 6 weeks and 6 months PP
- Cr 1.4 – 1.9 = 1 in 49 **(2%)** have worsening of renal disease
- Cr 2.0 or greater = 7 in 21 **(33%)** have worsening of renal disease

Renal Disease in Pregnancy

- Chronic Kidney Disease
 - Stage 3 – 5
- Obstetric outcomes
 - >70% preeclampsia
 - >60% moderate-severe anemia
 - >50% small for gestational age neonate
 - Prematurity
 - 6% <28wk
 - 24% <34wk
 - 76% <37wk

Example Case

- 39yo G1P0 at 9wk with a history of poorly controlled diabetes and hypertension

Evaluation

1. Assessment of baseline labs
2. Options counseling based on baseline Cr and likelihood for worsening renal function, poor perinatal outcomes
3. Initiate low-dose aspirin
4. Evaluate chronic medications for use in pregnancy

Renal Disease in Pregnancy

- Obstetric-related renal disease
 - Hypertensive disorders
 - Acute kidney injury from obstetric complications
 - Urinary tract infections and pyelonephritis in pregnancy

Renal Disease in Pregnancy

- Pre-eclampsia
 - Hypertension & proteinuria

Cr 1.1 or doubling
of baseline Cr

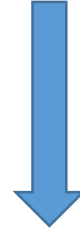


Renal failure

Renal Disease in Pregnancy

Pregnancy as a window to future disease

Pre-eclampsia



Increased risk for cardiovascular and renal disease

Renal Disease in Pregnancy

Thrombotic thrombocytopenic purpura (TTP)

- 10x more common in pregnancy
- 2nd – 3rd trimester
- Severe thrombocytopenia, anemia, renal impairment and neurologic changes

Atypical hemolytic uremic syndrome (aHUS)

- Pregnancy can trigger
- Peripartum or postpartum
- Severe thrombocytopenia, anemia, renal impairment

Renal Disease in Pregnancy

- Obstetric-related renal disease
 - Acute kidney injury from obstetric complications
 - Hemorrhage
 - Sepsis
 - Hypovolemia
 - Hyperemesis gravidarum
 - Ovarian hyperstimulation syndrome

Renal Disease in Pregnancy

- Obstetric-related renal disease
 - Acute kidney injury from obstetric complications



Treatment

- Address offending disease process
- Volume repletion
- Close monitoring for recovery

Example Case

- 27yo G2P0010 at 29 weeks
 - History of poorly controlled hypertension
 - Vaginal bleeding and abdominal pain
 - Ultrasound → intrauterine fetal demise
 - Exam → severe range hypertension, ongoing vaginal bleeding, cervical dilation to 6cm
 - Labs → Hct 28, Plt 75, Cr 1.8, ALT 150, AST 177, fibrinogen 110, PT prolonged

Example Case

- 27yo G2P0010 at 29 weeks

Diagnoses

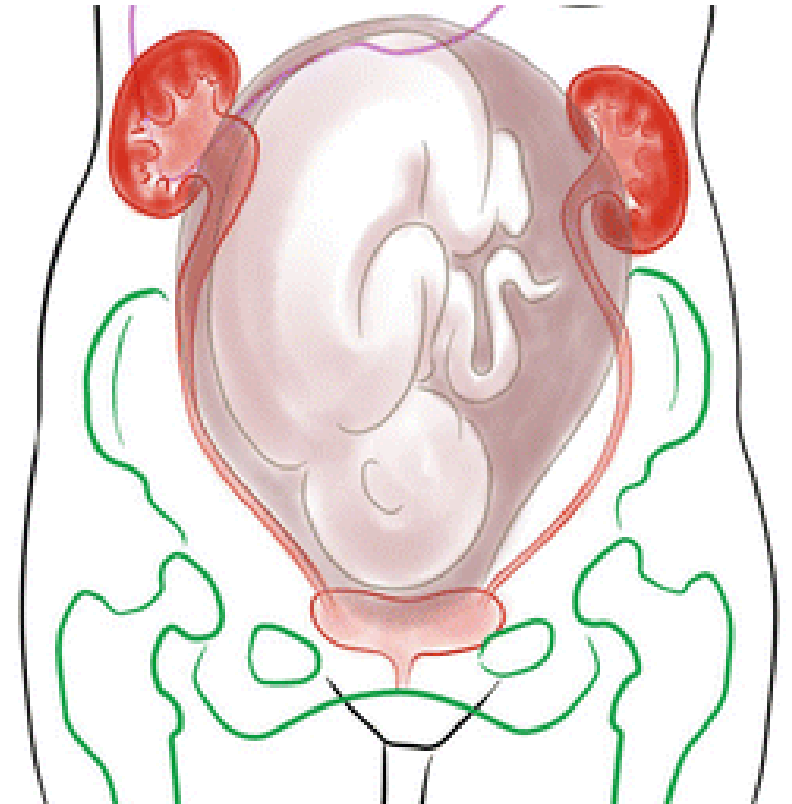
- Chronic hypertension
- Superimposed pre-eclampsia with severe features / HELLP syndrome
- Acute kidney injury (? On chronic)
- Placental abruption
- IUFD
- Disseminated intravascular coagulation

Management

- Delivery, resuscitation, close monitoring for recovery in end-organ systems

Renal Disease in Pregnancy

- Obstetric-related renal disease
 - Asymptomatic bacteriuria
 - Urinary tract infections (cystitis)
 - Pyelonephritis



Renal Disease in Pregnancy

- Screen for asymptomatic bacteriuria
 - Treatment reduces risk of progression to pyelonephritis
- Two or more episodes of asymptomatic bacteriuria or cystitis OR an episode of pyelonephritis
 - Prophylactic antibiotic treatment

Renal Disease in Pregnancy

Obstetric Considerations & Monitoring

- Blood pressure management
- Medication management
- Baseline renal function and proteinuria assessment
- Treatment with low-dose aspirin for pre-eclampsia risk reduction
- Fetal surveillance

Postpartum Follow-up

- Can take 8 weeks for renal function to normalize
- Monitor renal function and proteinuria
- Effective contraception!

Thank you!



Example Case

- 39

