

Physiologic Changes with Pregnancy

Anesthetic Pearls: Anesthetic Implications of Maternal Physiologic Changes During Pregnancy

Uterus progressively enlarges and at 12 weeks post-conception it rises above the pubic symphysis. At 20 weeks, the uterus reaches the umbilicus; and at 36 weeks it its maximal height at the costal margin. Thereafter, the fundal height drops as the fetal head engages. As the pregnancy progresses, the intrauterine environment changes from very protective to the fetus, to very vulnerable as the amniotic fluid volume decreases and the fetus increases in size. The uterine wall is initially thick and becomes progressively thin walled in the 3rd trimester.

Musculoskeletal

- Pubic symphysis widens to 8mm by 7th month
- Widening of sacro-iliac joints

Blood Volume

- Increase in total blood volume (40-50%)
- Relative anemia (greater plasma volume to cellular [RBC] volume)

Heart Rate

- Progressive increase in resting heart rate (relative tachycardia; increase of 20 beats/min above the non-pregnant state during the 3rd trimester)

Blood Pressure

- Decrease of MAP ~ 10 mmHg during 2nd trimester (return of MAP to non-pregnant level near term)
- Supine hypotension during 3rd trimester secondary to IVC compression
- Decreased peripheral vascular resistance

Cardiac Output

- Progressive rise (up to 1.5 L/min greater than baseline non-pregnant cardiac output beyond 10 weeks)

ECG

- Left axis deviation (up to 15°)
- Increase in ectopic beats

Respiratory

- Mild increase in respiratory rate secondary to effects of progesterone
- Increased tidal volume
- Increased minute ventilation
- Decreased functional residual capacity
- Relative hypocapnia (respiratory alkalosis) in 3rd trimester
- Increased oxygen consumption throughout pregnancy

Gastrointestinal

- Decreased gastric motility
- Decreased esophageal sphincter tone

