**Obstetric Patient and Anesthesia**

* Decrease in overall anesthetic requirements; MAC decreased by 40%
* Decrease gastric motility w/incompetent gastro esophageal junction leads to regurgitation of gastric contents. All OB pts need RSI
* Serum creatinine and BUN normal is lower than normal b/c RBF incr 40-90%, and GFR incr 50%. Glycosuria during pregnancy is not necessarily abnormal as there is an incr in GFR with impaired tubular reabsorption for filtered glucose; may be reason for incr incidence of UTI in pregnancy.
* Increase plasma volume from 40-70 mL/Kg is greater than RBC mass increase leading to dilutional anemia. Normal HCT in OB patient will be 34%.
* Cardiac output doubles during active labor; immediately after birth there is an autotransfusion of 500-700 ml.
* Aortocaval compression (s/s similar to shock): hypotension, tachy, pallor, sweating, N/V, changes in cerebration. TX by left uterine displacement (LUD) with wedge under R hip.
* Respiratory tract mucosa engorged and friable, needs one size smaller ETT than normal
* Progesterone increases minute ventilation, relaxes bronchial muscle, sensitizes respiratory center to CO2 and stimuli and vasodilates vessels, decreasing SVR.
* OB pts have decreased FRC and expired volumes and can develop hypoxia and hypercarbia rapidly. Normal PCO2 is 27-32 d/t increased minute ventilation and tidal volume (with incr AP diameter); this all creates a respiratory alkalosis. If pt hyperventilates during labor, *resp alkalosis* may worsen and shift oxyhgb curve to left, decreasing uterine blood flow (UBF) and amount of O2 delivered to fetus.
* Factors with uteroplacental perfusion: Uterine vasculature is not autoregulated; it is maximally dilated by can constrict.
  + Aortocaval compression
  + Hypotension: SBP<100 mm Hg or fall of normal BP 25% cause decreased UBF
  + Increased uterine vascular resistance caused by: Contractions, IV ketamine, Pitocin, abruption placenta, maternal hypoxia, hypercarbia, hypocarbia, catecholamines (ephedrine affects less)

**Anesthesia for Labor and Delivery**

* **Normal Blood Loss**
  + Vaginal: 400-600 cc
  + Twins: 1000 cc
  + C/S: 1000
* **Labor Pain**

**First Stage:** Stage of cervical dilation; last 8-12 hrs. Labor pain arises from T11-T12; autonomic C-fibers from cervical dilation/effacement in uterus; block to lever T10-L1.

**Second Stage**: Stage of expulsion; lasts 20-50 min. Labor pain arises from S2-S4; A-delta fibers from vagina, vulva, and perineum; block to level S2-S4.

**Obstetric Labor and Delivery Medications**

AMPLE history: **A**llergy/**M**eds/**P**ast illnesses/**L**ast meal/**E**vents

**Labor**

**Spinal:**

* Bupivacaine 1.25 – 2.5 mg + fentanyl 25 mcg.
  + Lasts 1-1.5 hr with low placental transfer to fetus

**Epidural**

* Bupivacaine 0.625%-0.125% (high quality analgesia with minimal motor blockade) or ropivacaine 0.125%-.02% with fentanyl 1-2 mcg/ml.
  + Load 8-12; maintain 8-12 mL/hr infusion.
* Lidocaine < 1%-2%
* Ropivacaine 0.1%-0.2%

**Vaginal Delivery**

**Spinal** (in sitting position):

* Lidocaine 20-40mg
* Bupivacaine 6-7 mg
* Tetracaine 3-4 mg

**Epidural**

* Lidocaine 1.5%-2% with epi 10-30 mL;

DOA 60-90 min

* 3% 2-chloroprocaine (epidural only) 10-30 mL;

DOA 30-60 min

* Bupivacaine < 0.25%-0.75%
* Ropivacaine 0.2%-1.0%

**Cesarean Section**

**Elective**

* Block to T4-T6
* **Spinal blockade:**
  + Bupivacaine 0.75% in 8.25% dextrose; 1.6 ml (12-15 mg)
  + Lidocaine 60-77mg
* **Intrathecal opioids** can be given with bupivacaine and lidocaine
  + Fentanyl 10-25 mcg
  + PF Morphine 0.1-0.25 mg
* **Epidural blockade:**
  + Lidocaine 1.5%-2% w/1:200,000 epi
  + Ropivacaine 0.2%-0.5%
  + Bupivacaine 0.5% - slowest onset and longest duration (not use much)
  + 2-chloroprocaine 3% - most rapid onset and shortest duration
* **Epidural opioids** can be given with LA listed above (note: opioid doses for epidural are 5-10X that of spinal opioid doses);
  + Fentanyl 50-150 mcg
  + Sufentanil 10-20 mcg
  + Morphine 5 mg
  + Meperidine 50-100 mg

\*\* Epidural morphine 3-5 mg can be combined with fentanyl 25-50 mcg to achieve a rapid onset and long duration of analgesic action.

\*\* Epinephrine can be added to LA to decr systemic absorption, prolong duration of the anesthetic, and increase the intensity of the sensory block; can also increase the intensity of the motor block.

* **Uterine Atony**
  + **Oxytocin** 10-20 units after placental delivery
  + Bolus may cause hypotension and possible cardiovascular collapse; give slowly
  + **Methylergonovine** 0.2 mg IM; contraindicated in pts with HTN, seizures, CVA, retinal detachment, and cardiac arrest.
  + **Hemabate** 250 mcg IM; used with caution in pts with history of asthma, hypo- or hypertension, anemia, diabetes, or epilepsy.

**Emergency**

* **Spinal**
  + 3% 2-chloroprocaine 20-30 mg
  + Lidocaine 2% with epi 1:200,000; 15-20 mg
* HOTN can result from a sympathetic blockade, which decreases SVR and increases venous capitance. These changes result in blood pooling peripherally with a decreased preload. Prophylactic avoidance is done with prehydration before spinal or epidural placed, LUD, IM ephedrine (given ~ 10 min before block). Maternal monitoring of BP, O2 sat, and EKG are done continuously. IV ephedrine 5 mg as needed to treat HOTN.

**Unexpected complications When Mother or Fetus Is in Immediate Jeopardy**

* GETA for emergency C/C
* 4-5 deep breaths at 100% FiO2
* Cricoid pressure with RSI (after patient is draped and surgeon prepared to make incision)
* Propofol or Ketamine
* Pre-intubation succinylcholine, no defasiculating dose necessary
* May not need NDMR block or use minimal dose of NDMR
* ½ MAC with 100 FiO2
* Narcotic and midazolam after cord clamped
* Extubate awake

**General Information**

**Spinal Needles**

* **Quincke**: Cutting needle; end injection
* **Whitacre**: Pencil point rounded; side injxn; decree incidence of PDSH
* **Sprotte:** Long opening at end; side injxn; increases turbulence in CSF

**Epidural Needle**

* **Tuohy**: Epidural “introducer”; tread catheter thru Tuohy.
* The blunt tip helps push the dura away (after passing through the ligamentum flavum) instead of cutting it.

**Test Dose**

* Detects both intrathecal and intravascular injection
* Combination of LA and epi: Classic test dose: 1.5% Lido with 1:200,000 epinephrine.
* This 45 mg Lido (3 cc of 1.5%) will produce spinal anesthesia that is rapidly apparent. The 15 mcg of epi, if enters bloodstream, will increase HR > 20%
  + ***False +*** : Pain (do not inject during contraction)
  + ***False -*** : Pt on beta blockers

**Tissue Planes Traveled Through Midline Approach**

Skin→ SubQ → Supraspinous ligament → Interspinous ligament → Ligamentum flavum → Epidural Space → Dura (spinal) → Arachnoid (spinal)

* Paramedian Approach does not go through the Supraspinous or Interspinous ligaments

**Obstetric disease**

**Preeclampsia**

* HTN after 20th week gestation (HTN: SBP>140, DBP > 90 mm Hg)
* Proteinuria: +1- +2, and generalized edema > +1

**Eclampsia**

* SBP > 160 to 180, DBP > 110 mm HG, proteinuria, oliguria, HA, visual disturbances, pulmonary edema, thrombocytopenia, presence of seizures or coma in preeclamptic state.

**HTN Crisis and Seizures**

* Magnesium sulfate raises seizure threshold, interferes with calcium at neuromuscular jxn, causes CNS depression, and dilated cerebral vessels.
* It increases UBF and RBF, is tocolytic, a bronchodilator, and reduces plt. Aggregation
* Therapeutic range is 4 to 8 mEq/L

**HELLP Syndrome**

* Associated with preeclampsia; can rapidly progress to DIC
* TX: Deliver the baby
* **H**emolysis: Bilirubin > 1.2 mg/dl; LDH > 600 units/L

**E**levated **L**iver enzymes: SGOT > 70 units/L

**L**ow **P**latelets: < 100 K

**Uterine Rupture**

* Potential major blood loss; GETA, laparotomy for uterine repair or hysterectomy. Potentially catastrophic complication.

**Uterine Inversion**

* Peritoneal traction can cause inverted uterus with vagal response causing severe hypotension and bradycardia.
* TX: bradycardia with atropine .04 mg or glycopyrrolate 0.2 mg and fluid volume.
* Need uterine relaxation to correct inversion.
  + May require GETA
  + First try NTG 50 – 100 mcg IVP (very small doses)
  + Can use magnesium, terbutaline, and opioids.
  + Be prepared to treat Hypotension.

**Retained Placenta**

* NTG 50 – 100 mcg IV for uterine relaxation; may need GETA.

**Amniotic fluid Embolism (AFE)**

* Sudden entrance of amniotic fluid into maternal blood supply. Leads to sudden pulmonary vasospasm, pulmonary HTN, acute cor pulmonale, hypoxia, CV collapse with hypotension, and coagulopathy (DIC).
* Mortality is 50% within 1st hour; DIC occurs 80% after 1st hour.
* TX: CPR, intubate and ventilate, defibrillate, all ACLS drugs can be utilized, need CV access; left uterine displacement, correct coagulation. DELIVER BABY ASAP BY C/S.

**Placental Conditions:**

* **Placenta previa**: Placenta implants in lower uterus; bright red blood and painless
* **Placenta abruption**: Bleeding b/w placenta and myometrium (>4 L); usually without bleeding seen but hemorrhage can be severe (but concealed in the expanding uterus). Sudden increase in pain typical. Most common cause of DIC in pregnancy.
* **Placenta accreta**: Placenta abnormally adheres onto myometrium surface.
* **Placenta increta**; Placenta invades into myometrium.
* **Placenta percreta**: Chorionic villi erode thru myometrium and can invade bowel, bladder, or other pelvic organs and vessels. May need hysterectomy, but there are some conservative options are available.