

WHAT'S NEW IN OBSTETRIC ANESTHESIA FROM 2012?

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(* I have no conflicts to disclose. *)



**“If physicians would read two
articles per day out of the six
million medical articles published
annually, in one year, they would
fall 82 centuries behind in their
reading.”**

WF Miser, 1999

POLICIES AND GUIDELINES

GOALS & OBJECTIVES

Participants will internalize and be able to discuss:

1. How emerging research is changing clinical practice and enhancing patient safety.
2. New developments in policies and guidelines, maternal and fetal effects of labor analgesia, and management of cesarean delivery.
3. Prevention and treatment of anesthetic and obstetric complications and co-morbidities.
4. Evaluation and care of the fetus and newborn.

COST OF CESAREANS

Cesareans cost 50% more than vaginal birth due to longer hospital stay, ↑ maternal cx.

- Medicaid: \$13,590 vs. \$9,131
 - Private insurers: \$27,866 vs. \$18,329
 - Estimated U.S. loss of \$5 billion / year
- Pay physicians and hospitals to eliminate early deliveries, reduce unnecessary cesareans, prevent complications of birth.

The Hill's Healthwatch, 1/7/13

CESAREAN MORBIDITY

Is cesarean associated with adverse outcomes in subsequent deliveries?

- ↑ anemia in subsequent births: OR 2.8
- ↑ abruption: OR 2.3
- ↑ uterine rupture: OR 268
- ↑ hysterectomy: OR 29

Counsel patients accordingly.

Am J Obstet Gynecol 2012;206:139

AVOIDING CESAREANS

If a woman expresses an antepartum preference for a cesarean, is she more likely to have one?

- If she preferred CD, 48% later had a cesarean.
- If she preferred VD, only 12% had a cesarean.
- OR 26 for elective cesarean if she expressed a cesarean vs. vaginal delivery preference.

Obstet Gynecol 2012;120:252

AVOIDING CESAREANS

Key points to reduce primary cesarean rate:

1. Inductions only for medical indications.
2. No elective inductions before 39 weeks.
3. Favorable cervix before induction.
4. Adequate time for latent and active labor before diagnosis of "failed induction".
5. Operative vaginal delivery is acceptable.

Obstet Gynecol 2012;120:1181

VACCINATIONS

ACOG recommends influenza vaccine, but only 10-24% of pregnant women receive it. When vaccinated in the first trimester:

- No ↑ in malformations, preterm birth or fetal growth restriction.
- ↓ in overall stillbirth rate.
- Risk of Guillain-Barre' 2/million doses.

JAMA 2012;308:184

AVOIDING CESAREANS

To reduce the rising cesarean rate:

1. Patience and active management of labor.
2. Payment reform (why less \$ for VD?).
3. Tort reform (e.g. TOLAC).
4. Patient education about the value of SVD.
5. Reduce elective inductions.

Obstet Gynecol 2012;120:1194

VACCINATIONS

A review of 117,347 pregnancies during the 2009 H1N1 pandemic:

- 54% were vaccinated.
- Vaccination ↓ risk of influenza (RR 0.3).
- Risk of fetal death doubled if the mother was diagnosed with influenza.
- Vaccine was not associated with fetal death.

N Engl J Med 2013;368:333

CONTRACEPTION

Study: Women received the reversible contraception method of their choice at no cost.

- Superior effectiveness of IUD and implants were emphasized to the patients.
- Abortion rates were less than half the regional and national rates.
- Rate of teen births was 6.3/1000 versus the U.S. rate of 34.3/1000.

Obstet Gynecol 2012;120:1291

“NORMAL” LABOR

- Compared to births in 1959-1966, primips in 2002-8 labored 2.6 hours longer
- Mothers are 2.7 years older and heavier (BMI of 24.6 vs 22.6).
- Use of oxytocin and epidurals are more common, while use of forceps is less.

Am J Obstet Gynecol 2012;206:419

POSTPARTUM STERILIZATION

ACOG encourages improved access to PPTL for women requesting it; an “urgent” surgery.

- 50% rate of repeat pregnancy in the following year in women who request but do not receive PPTL.
- Limited time to perform the procedure.
- Medicaid has cumbersome consent process compared to private insurance.

Obstet Gynecol 2012;120:212

“NORMAL” LABOR

- Inductions vs. spontaneous labor: 2 hours longer until active phase (6 cm).
- Obesity > BMI 30: longer duration and slower progress from 4-6 cm.
- TOL after cesarean: no difference in first-stage labor curves or dilation rate.

Obstet Gynecol 2012;119:732 and 1114

Obstet Gynecol 2012;120:130

LABOR ANALGESIA

NON-DRUG ANALGESIA

- Methods that clearly work = epidural, CSE, inhaled analgesia, but also most side effects.
- Those that *may* work = water immersion, relaxation, acupuncture, massage, and LA nerve blocks, with few adverse effects.
- Methods lacking evidence = hypnosis, biofeedback, sterile water injection, aromatherapy, TENS, parenteral opioids

Cochrane Database 2012; CD009234

NITROUS OXIDE ANALGESIA

26 randomized studies of inhaled analgesia:

- Better analgesia with flurane derivatives than nitrous oxide (pain scale Δ 14.4 mm).
- More nausea with nitrous than fluranes (OR 6.6).
- Nitrous oxide more effective than placebo, but \uparrow side effects such as N/V, dizziness.

Cochrane Database 2012; CD009351

DEXMEDETOMIDINE

Pregnant ewe study using 1 μ g/kg/hour:

- Sedation but no respiratory depression.
- \downarrow maternal BP and heart rate.
- No effect on fetal BP, heart rate or cerebral oxygenation.
- Maternal and fetal glucose increased.

Int J Obstet Anesth 2012;21:339

NITROUS OXIDE ANALGESIA

Overview of its use for labor analgesia:

- Currently used by 50% of women in the UK, Australia, Finland and Canada.
- Little effect on pain scores, but most women find benefit and wish to continue or use again.
- No adverse neonatal effects, no effect on uterine contractility.
- Neurotoxicity? Environmental pollution?

www.soap.org / Summer 2012 Newsletter

FATHERS

84 couples were studied to see if partner presence reduced *maternal* anxiety during epidural placement (father-in vs. father-out).

- There was no difference in maternal anxiety scores at baseline.
- Pain scores during epidural placement were higher in the father-in group.
- After epidural placement, mothers in the father-in group had higher anxiety scores.

Anesth Analg 2012;114:654

REMIFENTANIL

Retrospective review of remifentanyl versus fentanyl IV PCA for labor (98 women):

- No difference in pain scores.
- No difference in side effects.
- More desaturation with R: 13% vs 2% (OR 7).
- More neonates needed resuscitation with F: 59% vs 25% (OR 4).
- Cost difference??

Can J Anesth 2012;59:246

EPIDURAL FAILURES

Reasons for inadequate analgesia/anesthesia:

- Incorrect primary placement
- Secondary migration after correct placement
- Failure to use adequate LA concentration; choice of LA doesn't matter.
- Inadequate use of adjuvants, especially opioids and epinephrine
- PCEA + background may be best for postop

Br J Anaesth 2012;109:144

EPIDURAL FAILURES

Risk factors for failed conversion of labor analgesia to cesarean anesthesia:

1. More clinician top-ups during labor
2. Urgency of the cesarean (OR 40)
3. Non-obstetric anesthesiologist providing care (OR 4.6)
4. Not a risk: CSE vs. epidural, duration of epidural, dilation at placement, BMI

Int J Obstet Anesth 2012;21:294

EVALUATING HEMOSTASIS

How does the TEG change during pregnancy and postpartum?

- Samples were taken from 45 healthy pregnant women in all 3 trimesters, at term, and 8 weeks postpartum.
- ↑ coagulability and ↓ fibrinolysis throughout pregnancy.
- ↓ R value, ↓ K, ↑ angle, ↑ MA

Anesth Analg 2012;115:890

“BEST” ASEPTIC PRACTICES

300 anesthesia providers were randomized to 3 hand-washing techniques:

1. Soap + sterile towel →25% bacterial growth
2. Soap + sterile towel and alcohol gel →16% bacterial growth
3. Alcohol gel alone →4% bacterial growth

Can Anesth Society 2012; A1344599

CESAREAN ANESTHESIA

“BEST” ASEPTIC PRACTICES

Chlorhexidine is not FDA-approved for use before neuraxial anesthesia for lack of safety evidence, BUT ASA and ASRA guidelines recommend its use.

- Review of 12,465 spinal anesthetics over 5 years that had chlorhexidine skin prep.
- 0.04% had neurologic complications felt related to the spinal anesthetic- all resolved.
- Incidence was no different than previous reports using Betadine.

Reg Anesth Pain Med 2012;37:139

“NATURAL CESAREAN”

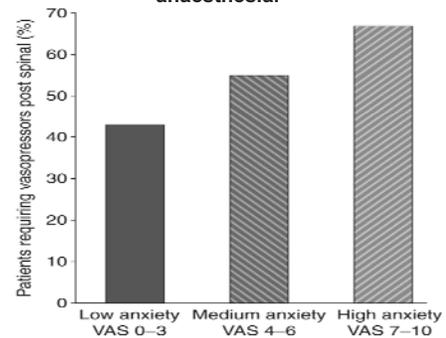
How can we make a cesarean (now 35% of deliveries) more “natural” and family-centered?

- Early skin-to-skin contact in the OR
- Slow delivery to mimic “vaginal squeeze”
- IV, oximeter, BP cuff on the non-dominant arm to facilitate holding her baby
- ECG leads on the back for breast-feeding
- Clear surgical drapes

Anesth Analg 2012;115:981



The use of vasopressors (either ephedrine or phenylephrine) in low, medium, and high anxiety groups (based on VAS), after the administration of spinal anaesthesia.



SURGICAL INFECTION

What interventions to prevent surgical site infections after cesarean are most effective?

- Administration of antibiotics within one hour of incision was associated with a 48% reduction in postop infections.
- ↑ BMI, ↑ hypertension, ↑ preeclampsia all ↑ infection rates.
- Banning artificial nails and improving O.R. cleaning had no effect on SSI.

Obstet Gynecol 2012;120:246

HYPOTENSION

Do we miss hypotensive events using intermittent BP measurements? Does it matter to mother or fetus?

- Continuous non-invasive pressures were compared to BP cuff (N=888)
- Hypotension was detected in 91% of continuous and 55% of BP cuffs
- Cord pH was lower when BP < 100 mmHg

Br J Anaesth 2012;109:413

HYPOTENSION

Does preop anxiety influence hypotension?

- 100 parturients were given anxiety scores prior to elective cesarean under spinal
- Patients scoring high on anxiety scales had significantly more hypotension and required more pressors
- No difference in neonatal outcomes

Br J Anaesth 2012;109:943

HYPOTENSION

How does bolus phenylephrine (P) compare to continuous infusion (120 µg/min) after spinal?

- Non-invasive cardiac outputs were no different between groups.
- Infusions received more P: 1740 vs. 964 µg.
- Infusion group had lower BP's in the first 6 minutes after spinal injection.
- No outcome benefits to using an infusion.

Anesth Analg 2012;115:1343

PHENYLEPHRINE

Two excellent reviews on the use of phenylephrine versus ephedrine for treatment of hypotension after regional anesthesia in obstetric patients:

- Anesth Analg 2012;114:377-90
- “Why Question Established Practice?” Anesthesiology 2012;117:1348-51

DIFFICULT AIRWAY

Comparison of awake fiberoptic intubation vs. awake video-laryngoscopy in 84 non-obstetric patients with anticipated difficult airways:

- Same topicalization and sedation used
- No difference in time to intubation, success on first attempt, ease of intubation, or patient assessment of discomfort.
- Good alternative for emergencies or when fiberoptic scope not available (most L&Ds?)

Anesthesiology 2012;116:1210

CONTINUOUS SPINAL

Case report: During attempted epidural placement for cesarean and possible hysterectomy for placenta accreta, wet tap occurred. Converted to CSA. Placenta increta → hysterectomy → 8L blood loss → 37 units blood products → stable hemodynamics but conversion to GETA for pulmonary edema. Ventilated for 18 hours and did well.

Can J Anesth 2012;59:473

AIRWAY MANAGEMENT

Healthy 44-yr old is NPO for termination of a 21-week pregnancy due to fatal anomalies. Is intubation mandatory?

- Pregnancy does not delay gastric emptying.
- LES pressure may be lower, but 2nd trimester similar to oral contraceptive effect.
- Pregnancy is not an independent risk factor for aspiration (J Clin Anesth 2006;18:102).

SAMBA Newsletter; January 2012:7

DIFFICULT AIRWAY

Review of obstetric tracheal intubations:

- 157/163 direct laryngoscopies successful on first attempt; 1 failure
- Failure rescued with video-laryngoscopy
- 18/18 video-laryngoscopies successful
- Providers chose the video-scope for emergencies, predicted difficult intubation.

Anesth Analg 2012;115:904

GENERAL ANESTHESIA

A review of 533 term babies S/P emergent cesarean for fetal compromise:

- GA = more likely to have Apgar < 7 (OR 6.9), need bag/mask ventilation for > 60 seconds (OR 2.3), and to be admitted to neonatal ICU (OR 2.2)
- *Despite* 8 minutes faster incision-to-delivery times than regional techniques

ANZJOG 2012;online 6/8/12

GENERAL ANESTHESIA

~ 80K cesarean deliveries analyzed for risk factors for postpartum hemorrhage:

- Emergency (3.2%) > planned (1.9%)
- General anesthesia ↑ risk (OR 2.7)
- Other risks as expected: twins, previa, macrosomia, failed induction or arrest of labor, abruption, anemia, HELLP.

Am J Obstet Gynecol 2012;206:76

TAP BLOCKS

A series of 5 patients used TAP catheters for post-cesarean analgesia.

- Repeated boluses of local anesthetic maintained good analgesia
- Multi-modal when combined with oral acetaminophen and ibuprofen
- Labor-intensive, and high levels of local anesthetic are a potential concern

Int J Obstet Anesth 2012;21:176

TAP BLOCKS

Defn: field block for abdominal surgery.

- Meta-analysis of 5 trials, 312 patients
- ↓ in IV morphine consumption by 24 mg over the first 24 hours postop
- ↓ opioid-related side effects
- No difference vs. spinal morphine

Br J Anaesth 2012;109:679

TAP BLOCKS

Blind technique versus ultrasound-guided?

- After placement of TAP blocks using a landmark technique, US was used to record the needle position and spread of LA.
- Study terminated early due to high number of peritoneal needle placements (18%)
- Correct placement occurred in only 24%

Br J Anaesth 2012;108:499

TAP BLOCKS

Randomized trial of TAP blocks versus intrathecal morphine 100 µg.

- TAP group required more morphine supplementation but had fewer opioid side effects
- Conclusion: Use TAP blocks when spinal morphine is contraindicated or unavailable.

Int J Obstet Anesth 2012;21:112

WOUND INFUSION

Randomized trial of 48 hours of continuous infusion of ropivacaine in the wound vs. epidural morphine 2 mg every 12 hours.

- ↓ pain scores in the infusion group: 0 vs. 3
- Less nausea, vomiting, pruritus and urinary retention in the infusion group
- Fewer nurse visits for pain management in the infusion group: 1 versus 8

Anesth Analg 2012;114:179

HYPOTHERMIA

Case report and review of 20 cases of severe hypothermia after spinal morphine:

- Patients complain of feeling warm, sweating, nausea
- Lowest temp 33-34 degrees C lasting 2-22 hours
- Reversed by lorazepam; mechanism?

Can J Anesth 2012;59:384

METOCLOPRAMIDE

Meta-analysis of 11 studies, 702 patients to prevent N/V after cesarean delivery:

- 10 mg given before block placement
- ↓ intraoperative nausea (RR 0.27) and vomiting (RR 0.14)
- ↓ postoperative nausea (RR 0.47) and vomiting (RR 0.45)
- No extra-pyramidal side effects seen

Br J Anaesth 2012;108:374

DEXAMETHASONE

Meta analysis of using dexamethasone to prevent nausea/vomiting in women undergoing laparoscopy for gyn surgery:

- 13 RCT with 1695 patients
- ↓ nausea (RR 0.56) and vomiting (RR 0.35)
- ↓ need for rescue anti-emetics
- ↓ time to meet discharge criteria
- No increase in adverse events

Obstet Gynecol 2012;120:1451

ANESTHETIC COMPLICATIONS

DEXAMETHASONE

Is dexamethasone effective at preventing N/V in women after neuraxial morphine?

- Meta analysis of 8 RCT, 768 patients
- Doses ranged from 2.5 mg to 10 mg
- ↓ nausea (RR 0.57), vomiting (RR 0.56), use of rescue anti-emetics (RR 0.47), but not pruritus
- ↓ pain scores and rescue analgesics (RR 0.72)

Anesth Analg 2012;114:813

CPR IN PREGNANCY

Simulated cardiac arrest exams for Board certification in Israel:

- Non-pregnancy related ACLS done well.
- Areas of deficiency related to pregnancy included LUD (performed by only 68%), cricoid pressure (48%), preparing for cesarean (40%).

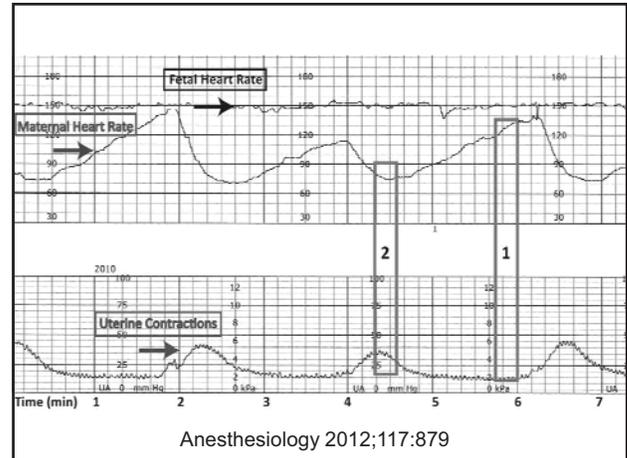
Anesth Analg 2012;115:1122

CPR IN PREGNANCY

Protocols for L&D emergencies such as cardiac arrest should be specific to maternal-fetal issues.

- Obstetric providers are not trained to manage the specifics of maternal cardiac arrest.
- The Obstetric Life Support (OBSL) program is described as multidisciplinary, simulation-enhanced, obstetric crisis training.
- It may be comparable to development of NRP (the Neonatal Resuscitation Program).

Sem Perinatol 2011;35:74



CPR IN PREGNANCY

Case report: Previously healthy 33 yr old woman at 20 weeks gestation suffered cardiac arrest at church. Bystander CPR was performed → spontaneous circulation after 25 minutes → transported to hospital with GCS 3 → therapeutic hypothermia instituted → recovery with mild amnesia, EF 25% → AICD.

- Uneventful delivery at 39 weeks.
- At 3 years of age her child has normal development and neurologic function.

Ann Emerg Med 2012

HEADACHE

Using the Nationwide Inpatient Sample, 639 cases of subarachnoid hemorrhage associated with pregnancy were identified.

- Incidence: 5.8 per 100,000 deliveries
- 67% occurred postpartum, 10.3% died (low)
- Demographics: older mothers, AA race, higher rates of hypertensive disorders (40% of cases), coagulopathy, substance abuse, SS disease, intracranial venous thrombosis, hypercoagulability.

Anesthesiology 2012;116:324

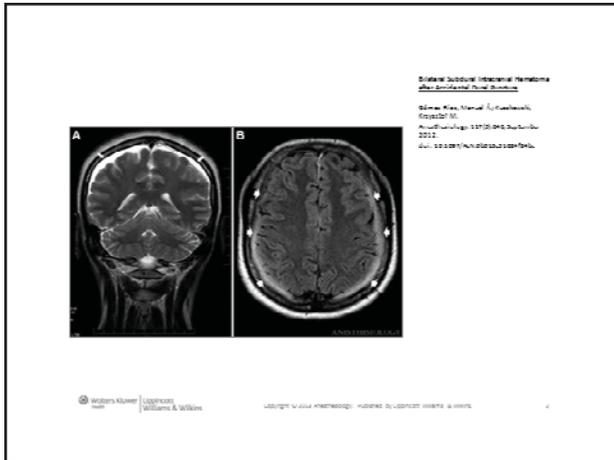
CARDIAC COMPROMISE

Case report: Induction at 37 weeks for cardiac decompensation due to bicuspid aortic valve and subaortic membrane. LV outflow gradient 80 mmHg. Uneventful low-dose epidural analgesia, but phenylephrine infusion needed to maintain BP. Cyclic variations of maternal heart rate developed with contractions while patient was supine, due to ↓ preload.

HEADACHE

Case report: Inadvertent dural puncture during epidural placement was followed by a positional PDPH. Blood patch provided only partial relief. Headache gradually became non-positional and associated with pain and paresthesias in her lower extremities. CT → bilateral subdural hematomas, managed conservatively with daily CT scans.

Can J Anesth 2012;59:389



HEADACHE

RCT of intrathecal catheter versus repeat epidural after wet tap (only 97 cases).

- No difference in incidence of PDPH
- 16g Tuohy doubled the risk over 18g
- SVD > risk than cesarean (RR 1.58)
- ↑ risk of difficult placement and 9% risk of second wet tap if epidural repeated – worth the risk?

Int J Obstet Anesth 2012;21:7

HEADACHE

Case report: Labor epidural was complicated by dural puncture, and epidural placed at another interspace when intrathecal catheter would not pass. She had excellent analgesia for labor but complained of back and left lower extremity pain during and after labor. No motor, bowel or bladder deficits. MRI → acute spinal subdural hematoma. Resolved over 48 hours without surgery.

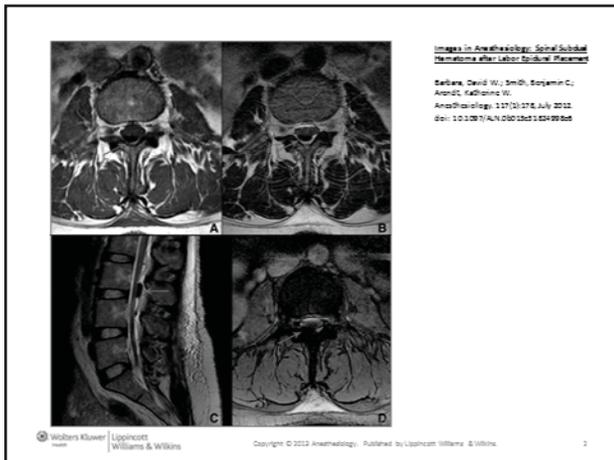
Anesthesiology 2012;117:178

HEADACHE

40 parturients with known wet tap using 17g Tuohy were followed at 12 and 24 months to assess headache and back pain. Compared to controls (no wet tap):

- 28% had chronic headache vs. 5%
- More likely to report chronic back pain (OR 7), but no association with blood patch.
- Pathophysiology and best treatment unknown.

Anesth Analg 2012;115:124



SURGERY IN PREGNANCY

Self-reported occupational exposures during pregnancy from 7482 nurses in the Nurses' Health Study II were used to investigate the risk of spontaneous abortion:

- 10% had spontaneous abortions < 20 weeks
- Exposure to anti-neoplastic drugs and sterilizing agents was associated with doubled risk.
- There was no association of early or late abortion with x-ray radiation or anesthetic gases.

Am J Obstet Gynecol 2012;206:327

LOCAL ANESTHETIC TOXICITY

ASRA and APSF emphasize that treatment of LAST is different than other cardiac arrest scenarios:

- AVOID vasopressin, calcium channel blockers, beta blockers, local anesthetics
- REDUCE each epinephrine dose to $< 1 \mu\text{g}/\text{kg}$
- Use lipid emulsion 20% 1.5 ml/kg over 1 min

APSF Newsletter 2012;13



LOCAL ANESTHETIC TOXICITY

Lipid emulsion has been used to treat:

- Ropivacaine, bupivacaine toxicity
- Many other lipophilic drugs: haldol, tricyclics, beta-blockers, calcium channel blockers, and others
- Anesthesiologists should consider use of Intralipid in other resuscitation situations

Anesthesiology 2012;117:180

MATERNAL MORTALITY

10 “clinical diamonds” to prevent maternal death:

1. A pregnant patient reporting acute chest pain needs an immediate spiral CT.
2. A patient with preeclampsia and SOB needs an immediate chest x-ray + pulse oximetry.
3. A hospitalized patient with preeclampsia needs an IV anti-hypertensive within 15 minutes for BP > 160 systolic or 110 diastolic.

OBSTETRIC COMPLICATIONS

4. Uterine embolization is not meant to be used for acute, massive postpartum hemorrhage.
5. Any patient with structural or functional cardiac disease gets an MFM consult.
6. If more than 1 dose of medication is needed to treat uterine atony, go to the patient’s bedside until the atony has resolved.
7. Never treat “postpartum hemorrhage” without also pursuing an actual clinical diagnosis.

8. In the postpartum patient who is bleeding or recently stopped bleeding and is oliguric, furosemide is not the answer.

9. Any woman with placenta previa and 1 or more cesarean deliveries should be delivered at a tertiary care medical center.

10. If your labor and delivery unit does not have a recently updated massive transfusion protocol based on established trauma protocols, get one today.

Obstet Gynecol 2012;119:360

NEAR-MISSES

CDC review of severe morbidity rates for delivery and postpartum hospitalizations:

- Rates have ↑ over 10 years by 75% for delivery and 114% for postpartum events.
- ↑ rates of blood transfusion, acute renal failure, shock, acute MI, ARDS, aneurysms, and cardiac surgery.
- Overall mortality ↑ in U.S. vs. other countries.

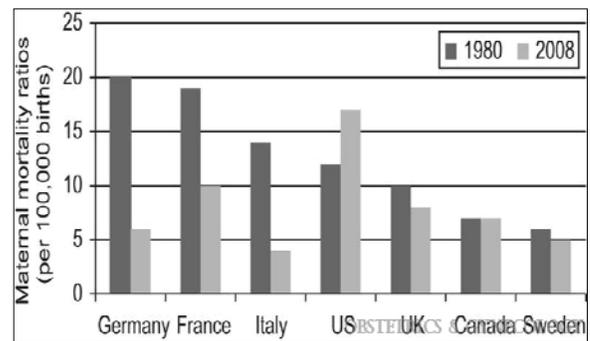
Obstet Gynecol 2012;120:1029

MATERNAL MORTALITY

CDC compared causes of pregnancy-related mortality by race / ethnicity.

- Minority women are 41% of the population but 62% of the deaths.
- U.S.-born black women = 5.2 times higher.
- Foreign-born blacks = 3.6 times higher.
- Causes and timing of deaths were similar.

Obstet Gynecol 2012;120:261



Obstet Gynecol 2012;120:929

NEAR-MISSES

As a surrogate for a near-miss, characteristics of mothers admitted to ICU were examined:

- 87% admitted postpartum
- African-American > other races, but no differences in outcomes.
- Leading diagnoses: cardiac disease (36%), hemorrhage (29%), sepsis (9%).

Obstet Gynecol 2012;119:250

HYPERTENSION

ACOG Practice Bulletin #125:

- ACE inhibitors and angiotensin receptor blockers are contraindicated in all trimesters of pregnancy → teratogenicity.
- Avoid atenolol (IUGR) and diuretics.
- Treat severe hypertension; labetalol is a good first-line option.
- Follow maternal end-organ involvement and fetal growth restriction by ultrasound.

Obstet Gynecol 2012;119:396

HYPERTENSION

Does thyroid function affect incidence of hypertension? Incidence of HTN:

- Euthyroid → 8.5% had HTN
- Subclinical hyperthyroid → 6.2%
- Subclinical hypothyroid → 10.9%
- OR 1.6 for *hypothyroidism* and severe preeclampsia (p=.03).

Obstet Gynecol 2012;119:315

HYPERTENSION

What is the best route of delivery for eclampsia \geq 34 weeks?

- 200 eclamptic patients were randomized to vaginal delivery or C/S; analyzed with intent-to-treat.
- Maternal events: 11% C/S vs. 7% VD (NS)
- Newborn events: 10% C/S vs. 19% VD (NS)

Am J Obstet Gynecol 2012;206:484

HYPERTENSION

Can ratios of sFlt-1 : PlGF identify women with preeclampsia who need to be delivered vs. other forms of HTN?

- Women with PEC had higher ratios than gestational HTN or chronic HTN.
- Highest sFlt-1 (anti-angiogenic) : PlGF (pro-angiogenic) ratios had significantly reduced time to delivery (p<.001)

Am J Obstet Gynecol 2012;206:58

HYPERTENSION

Case report: 25-year old G1 presented with severe preeclampsia and IUFD. Platelets 12K, Hct 23%, 4+ proteinuria, and \uparrow LFTs. She was induced and delivered a stillborn vaginally. Postpartum she deteriorated with acidosis, hyperglycemia, and hypoxemia → cardiac arrest and death. Autopsy → acute necrotizing pancreatitis due to severe preeclampsia.

Obstet Gynecol 2012;120:453

HYPERTENSION

Hepatic rupture occurs in 2% of HELLP syndrome cases. A series of 9 cases:

- Hepatic artery embolization was used in 7(78%) vs. 6% in the literature.
- Maternal mortality 0%, fetal mortality 30% vs. 17% and 38% in the literature.
- Need early diagnosis; consider embolization.

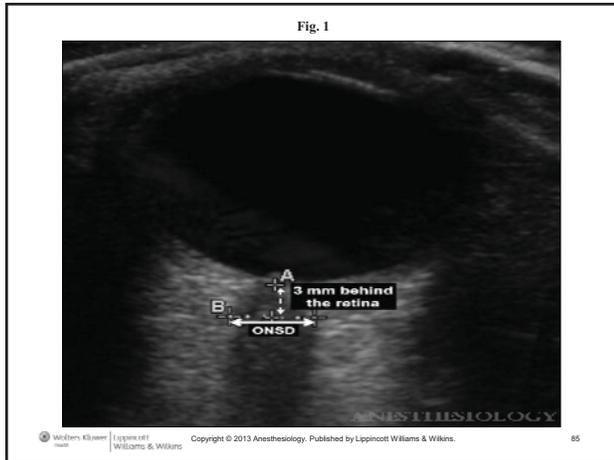
Obstet Gynecol 2012;119:617

HYPERTENSION

Method to diagnosis \uparrow ICP in preeclampsia:

- 26 pre-eclamptic and 25 healthy pregnant women had ultrasound measurements of their optic nerve sheath diameter
- Diameter was significantly greater in PEC but normalized after the 3rd PP day.
- 20% of the pre-eclamptic patients had measurements compatible with ICP > 20.

Anesthesiology 2012;116:1066



HEMORRHAGE

ACOG Committee Opinion: Placenta Accreta

- Greatest risk with previous cesarean *plus* placenta previa
- Ultrasound is sensitive (77-87%) and specific (96-98%)
- Consider transfer to a tertiary care center
- Delivery at 34 weeks after steroids, no amnio
- Planned hysterectomy with placenta left in situ

Obstet Gynecol 2012;120:207

HYPERTENSION

Review of the anesthesiologist's role in co-managing patients with preeclampsia.

- IV labetalol or hydralazine if $> 160/110$
- MgSO₄ to prevent and treat seizures
- Treat pulmonary edema no differently
- Regional analgesia/anesthesia is best
- Postpartum → analgesia, thromboprophylaxis

Anaesthesia 2012;67:1009

HEMORRHAGE

Trends of peripartum hysterectomy, 1994-2007:

- Overall rate ↑ 15%, largely explained by the increasing rates of 1^o and repeat cesareans.
- Hyst for abnormal placentation ↑ 1.2-fold
- Hysterectomy for atony ↑ 4-fold after repeat CD, 2.5-fold after primary cesarean, and 1.5-fold after vaginal delivery.

Am J Obstet Gynecol 2012;206:63

HYPERTENSION

Risk factors for continued / chronic hypertension after preeclampsia:

- 17% continue to be hypertensive
- Related to obesity, ↑ insulin levels, ↑ LDL, micro-albuminuria, family history of hypertension (RR 3.7), and delivery before 34 weeks gestation.
- OR 4.3 for recurrence in pregnancy

Obstet Gynecol 2012;120:311

HEMORRHAGE

What is the uterine pathology after hysterectomy for intractable atony?

- 1.7% rate of emergent peripartum hyst; 34% were for intractable atony
- Atony cases were more likely at term, had clinical chorioamnionitis, and had longer labors (8 hours vs. 2.5 hours)
- Path → acute inflammation and infection

Obstet Gynecol 2012;119:1137

HEMORRHAGE

What lab test(s) predict severity of bleeding?

- 738 women with PPH after VD
- Severe = drop in Hgb ≥ 4 , transfusion of PRBC, embolization, ICU admit or death.
- Average fibrinogen at diagnosis of PPH=420
- OR=1.9 for severe PPH if fibrinogen 200-300 and OR=12 if fibrinogen < 200.

Br J Anaesth 2012;108:984

HEMORRHAGE

Case report: G8P2 had urgent cesarean for abruption → atony → transfusion but ongoing coagulopathy → 5 mg rFVIIa with resolution. Later that day she developed shortness of breath, tachycardia and oxygen saturation 80%. CT → pulmonary emboli, but no DVT on US so presumed due to the Factor VII. She recovered with anti-coagulation.

J Clin Anesth 2012;508

HEMORRHAGE

What is the optimal dose of oxytocin to prevent hemorrhage after vaginal delivery?

- Blinded RCT compared 10, 40, 80 units in 500 ml over 1 hour after delivery.
- No difference in atony or hemorrhage.
- 80 unit group had less need for further oxytocin (RR 0.41) and fewer falls in Hct > 6% (RR 0.83)

Obstet Gynecol 2012;119:293

HEMORRHAGE

Case report: G10P8 had emergency cesarean for previa, and increta was found. Massive transfusion → continued bleeding → emergency embolization of main iliac artery trunks using Gelfoam. Bleeding resolved. After extubation POD#2, she complained of buttock pain, incontinence and paraplegia. Required extensive debridement of buttock necrosis. Bilateral lumbosacral plexopathies with denervation partially resolved over 8 months.

Obstet Gynecol 2012;120:468

HEMORRHAGE

Incidence of fever after misoprostol (Cytotec®) to prevent PPH:

- Sublingual 15%, oral 11%, rectal 4%
- Overall RR=5 compared with placebo or other oxytocics
- Highest incidence with high-dose sublingual route

Obstet Gynecol 2012;120:1140

HEMORRHAGE

Nationwide Inpatient Sample (NIS) database was searched for any association between race / ethnicity and the risk of PPH due to post-partum uterine atony. Relative to Caucasian:

- Hispanic had ↑ risk, OR 1.2.
- Asian / Pacific Islander had ↑ risk, OR 1.3.
- Gene expression or genetic polymorphisms?

Anesth Analg 2012;115:1127

HEMORRHAGE

Use of a massive transfusion protocol in obstetrics; a 3-year review:

- Activated in 0.25% of deliveries
- 61% CD, 32% VD, 7% D&E
- Median EBL 2842 ml (800-8000 ml)
- Median 3 PRBC, 3 FFP, 1 U platelets
- 61% to ICU and 19% hysterectomy

Int J Obstet Anesth 2012;21:230

UTERINE RUPTURE

What is the risk of rupture with induction in women attempting TOLAC?

- If cervical exam favorable for induction, no different than spontaneous labor.
- Initial unfavorable cervical exam associated with ↑ risk (RR 4).
- Restrict induction for TOLAC to patients with a favorable cervical exam.

Am J Obstet Gynecol 2012;206:51

HEMORRHAGE

Cochrane evidence: Is a lower vs. higher Hgb transfusion threshold best to minimize transfusion and adverse outcomes in acute care settings?

- A Hgb threshold of 7-8 g/dl is associated with fewer PRBC transfused without adverse associations with mortality, cardiac morbidity, functional recovery or length of hospital stay.

JAMA 2013;309:83

UTERINE RUPTURE

Is the rupture and accreta risk higher with prior myomectomy vs. classical cesarean delivery or low transverse incision?

- GA at delivery: 37.3 wks myomectomy, 35.8 wks prior classical vs. 38.6 wks LCT
- No ↑ risks after prior myomectomy
- Prior classical incision had ↑ rupture (OR 3.23) and ↑ accreta (OR 2.09)

Obstet Gynecol 2012;120:1332

UTERINE RUPTURE

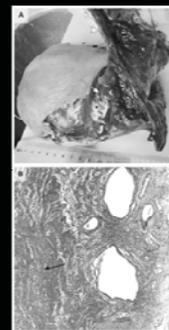
How does decision-to-delivery time affect neonatal outcome with uterine rupture?

- Frequency of rupture during TOLAC = 0.32%
- 75% presented with fetal signs, 25% with maternal signs only
- Good outcome: mean time to delivery = 16 min; no pH < 7 if delivered in < 18 minutes
- Bad longterm outcome if delivery > 30 min

Obstet Gynecol 2012;119:725

Supracervical Hysterectomy Specimen.

1A. 9cm postero-lateral laceration extending to the lower uterine segment with hemorrhage in the uterine wall.



1B. Hemorrhagic necrosis of the uterine wall.

Calabrese R.E. et al. N Engl J Med
2012;367:1829-1845

THE NEW ENGLAND
JOURNAL OF MEDICINE

AMNIOTIC FLUID EMBOLISM

Case scenario: G4P3 underwent several version attempts using epidural analgesia, followed by seizure, cardiac collapse, and uterine atony with hemorrhage and coagulopathy. She was successfully resuscitated, neuro intact.

Ddx Pathophysiology

Clinical course Diagnosis

Risk factors Management

Anesthesiology 2012;116:186

INTRAOP EMBOLUS

Case report: 40 yr old G7P1 for term elective repeat cesarean. PMH: Factor V Leiden mutation, on heparin until 36 hours preop. During uterine closure, asystole → CPR → TEE showed pulmonary embolus and RV strain and dilation → cath lab for clot lysis with tPA → successful clot removal but profuse vaginal and incisional bleeding → bilateral uterine embolization → hysterectomy → full recovery.

J Clin Anesth 2012;24:582

AMNIOTIC FLUID EMBOLISM

Case record: Multiparous woman with known previa was admitted at 36 weeks for bleeding. Emergency cesarean was uncomplicated, but 20 minutes postpartum she reported chest pain and had cardio-respiratory collapse with PEA. TEE → dilated RA, severe TR, D-shaped LV with small cavity. Placed on ECMO. Required dialysis. Discharged from ICU after 13 days. She and baby are healthy 1 year later.

N Engl J Med 2012;367:2528

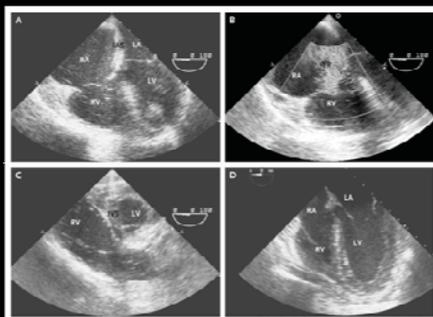
SEPTIC SHOCK

Clinical Expert Series:

- Incidence: 0.01% of deliveries
- Etiology: pyelonephritis, septic abortion, chorioamnionitis or endometritis, pneumonia, necrotizing fasciitis
- 28% mortality
- Early goal-directed therapy: antibiotics, resuscitation, hemodynamic management.

Obstet Gynecol 2012;120:689

Intraoperative Transesophageal Echocardiograms.



CONF. AL. 66. 11. 1371. J. MED. 2012;367:2528-2535

THE NEW ENGLAND JOURNAL OF MEDICINE

SEPTIC SHOCK

Review article: Sepsis in obstetrics.

- Resuscitation bundle: measure serum lactate, obtain cultures, administer broad-spectrum antibiotics in 1 hour, fluid resuscitate + pressors / inotropes as needed, CVP 8-12 mmHg, maintain oxygenation and ventilate as necessary.

Int J Obstet Anesth 2012;21:56

SEPTIC SHOCK

Case record: G1 had cesarean after 34 hours of labor with clinical chorio. Postpartum developed fever, dyspnea, tachycardia with EF 38%. Remained ill on broad-spectrum antibiotics with incisional drainage → endometrial abscess on CT → total hysterectomy → serial debridements for necrotizing soft tissue infection → Sweet's Syndrome treated effectively with steroids.

N Engl J Med 2012;367:1046

OBESITY

RCT of 3 groups: exercise begun at 13 weeks, exercise begun at 20 weeks and control (no supervised exercise).

- Physical fitness improved in previously sedentary women.
- No difference in newborn birth weights.
- No association with preeclampsia, IUGR, SGA, or uterine blood flow.

Obstet Gynecol 2012;120:302

CARDIOMYOPATHY

State review of incidence and outcome:

- Incidence 1 in 2000-2800 live births
- Case fatality rate 16.5% (1 in 6 women died from their cardiomyopathy).
- Highest prevalence > age 35
- Black women 4x higher prevalence
- Main symptoms = dyspnea, fatigue

Obstet Gynecol 2012;120:1013

OBESITY

36% of adult women in the U.S. are obese.

JAMA 2012;307:491

Meta-analysis of interventions in pregnancy on maternal weight and obstetric outcomes:

- Both diet and exercise reduce weight gain.
- No differences in birth weights, SGA or LGA
- Dietary interventions → most effective, with improved pregnancy outcomes (e.g. ↓ PEC).

BMJ 2012;344:e2088

CARDIOMYOPATHY

Case report: Healthy G1 had uncomplicated cesarean under spinal anesthesia. 6 hours postpartum became hypotensive, tachycardic and febrile. TTE → well-filled LV with EF < 10%, no PE or evidence of MI. Changed management from fluid resuscitation to inotropes, diuresis, ACE therapy in the ICU. Recovered to NYHA class II by discharge.

Anesth Analg 2012;115:1033

SLEEP APNEA

Comparison of outcomes of pregnant women with OSA vs. without:

- More low birth weight babies, OR 1.76
- More preterm birth, OR 2.31
- More SGA babies, OR 1.34
- Higher C/S rate, OR 1.74
- Greater incidence of preeclampsia, OR 1.60

Am J Obstet Gynecol 2012;206:136

SLEEP APNEA

Prospective screening for OSA in obese pregnant women using overnight sleep studies:

- Prevalence 15.4%
- OSA group had higher BMI (47 vs. 38)
- More chronic hypertension (56% vs. 32%)
- ↑ incidence of cesarean (65 vs. 33%), pre-eclampsia (42 vs. 17%) and NICU admission (46 vs. 18%)

Obstet Gynecol 2012;120:1085

CANCER TREATMENT

21-year review of L&D management of women with cancer in a tertiary center:

- Incidence 0.1%, equally diagnosed before and during pregnancy
- 75% received regional for labor, 22% received general for cesarean
- Life-threatening cx with mediastinal tumors or metastases

Int J Obstet Anesth 2012;24:524

SLEEP APNEA

Does pregnancy-onset snoring predict hypertension vs. chronic snoring?

- 34% of women reported snoring, 25% had onset during pregnancy
- New onset snoring – not chronic - predicted gestational HTN (OR 2.36) and pre-eclampsia (OR 1.59)

Am J Obstet Gynecol 2012;207:487

THE FETUS AND NEONATE



CANCER TREATMENT

Should aggressive chemo be used when breast cancer is diagnosed during pregnancy?

- 10 women received dose-dense and 99 received conventional chemotherapy
- No difference in birth weight, GA at delivery, IUGR, anomalies, maternal or fetal neutropenia.

Obstet Gynecol 2012;120:1267

PRENATAL DIAGNOSIS

Several labs reported the ability to sequence the fetal genome from a maternal blood sample and to detect trisomy 21, 18, 13, and monosomy X cases with 100% sensitivity and specificity. No further need for amniocentesis or chorionic villus sampling?

Obstet Gynecol 2012;119:890

Nature 7/4/12

ASSISTED CONCEPTION

Should women over 40 have more embryos transferred than younger women?

- Odds of live birth were \uparrow in women > 40 when 2 embryos were transferred (OR 3.12)
- OR was smaller for women < 40
- Livebirth rates did not \uparrow with transfer of 3 embryos, but risk of adverse perinatal outcomes did increase.

Lancet 2012;379:521

FETAL SURGERY

Case report: Fetus with an oral teratoma required EXIT procedure at 25 weeks due to preterm labor. Under general anesthesia, fetus underwent bronchoscopy and tracheostomy while on placental circulation. Delivery and resection followed. The mother was discharged after 4 days.

Obstet Gynecol 2012;119:466

TOLERANCE TO THE FETUS

- A possible cause of recurrent miscarriage is rejection of the fetus by the maternal immune system.
- In animal studies, pregnancy-induced regulatory T cells recognize paternal antigens and suppress maternal effector T cells.

N Engl J Med 2012;367:1159

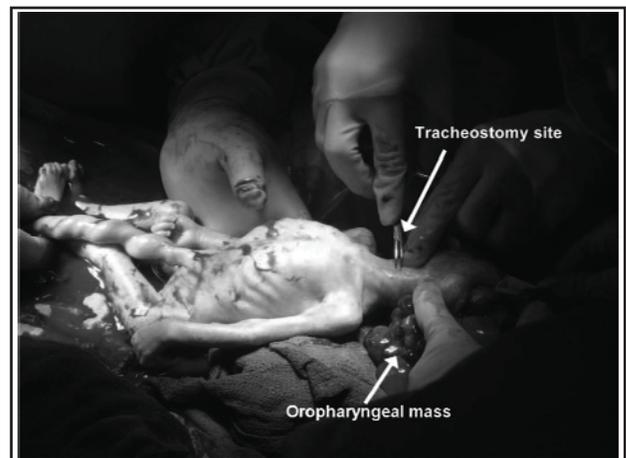


FETAL SURGERY

Fetal endoscopic tracheal occlusion is used to treat severe CDH.

- \uparrow survival: 54% vs. 5%
- Resulted in improvement in fetal lung size and pulmonary vascularity
- Response 4 weeks after occlusion can predict neonatal survival.

Obstet Gynecol 2012;119:93





PRETERM LABOR

Comparing nifedipine to placebo for *maintenance* tocolysis after first 48 hours:

- Blinded RCT of 406 women
- Average GA at randomization = 29 weeks
- No difference in any adverse perinatal outcome → no benefit to further tocolysis

JAMA 2013;309:41

PRETERM LABOR

ACOG Practice Bulletin #127:

- Give steroids if 24-34 weeks gestation.
- Give magnesium sulfate < 32 weeks for fetal neuroprotection.
- Give β -agonist, calcium channel blockers or NSAIDs → allows 48 hours for steroids.
- Further tocolytics, antibiotics, bedrest and hydration are not effective.

Obstet Gynecol 2012;119:1308

PRETERM BIRTH

ACOG Practice Bulletin #130:

- Leading cause of neonatal mortality.
- More survivors on the cusp of viability (~24 weeks), but also more disabilities.
- Multiple births have ↑ risk.
- Vaginal progesterone for at-risk women is the main modern treatment – not tocolytics or cerclage.

Obstet Gynecol 2012;120:

PRETERM LABOR

Comparing nifedipine to atosiban for tocolytic efficacy and tolerability:

- At 48 hours, 69% of atosiban and 52% of nifedipine patients were undelivered and did not require a rescue agent (P=.03)
- GA at delivery: 35.2 (A) vs. 36.4 (N), P=.01
- No difference in birth weight or morbidity

Obstet Gynecol 2012;120:1323

PRETERM BIRTH

Which mode of delivery is best for preterm (< 34 weeks) SGA babies?

- Database review of singleton, live-born, vertex neonates 25-34 weeks with IUGR
- 42% delivered vaginally, 58% cesarean
- No difference in any outcome except ↑ RDS in cesarean babies.

Obstet Gynecol 2012;120:560

PRETERM BIRTH

Using data from the randomized magnesium neuro-protection study, 29 SNPs associated with neuroprotection were evaluated.

- Odds of CP were increased 2.5 times for each copy of VIP allele
- Odds of CP were increased 4.5 times for each copy of NMDA 3A allele

Obstet Gynecol 2012;120:542

PRETERM BABIES

- 90% drugs administered to preterm babies in the NICU are not approved by the FDA.
- NICU babies often receive > 60 drugs.
- No new meds have improved outcome since steroids and surfactant 20 years ago.
- How to create safe harbors for industry liability and engage them in studies of new and existing drugs?

JAMA 2012;308:1435

PRETERM BABIES

Follow-up to an early CPAP vs. surfactant and low versus high oxygen saturation study:

- 990 surviving infants were examined at 18-22 months of age
- Death or neuro disability in 29% of CPAP vs. 30% of surfactant (p=0.38)
- Death or disability in 30% of low oxygen vs. 27.5% of high oxygen (p=0.21)

N Engl J Med 2012;367:2495

TERATOGENICITY

Database of women with singleton births who used SSRI's during pregnancy, 1996-2007:

- No association with stillbirth, neonatal mortality or morbidity.
- There are still concerns about other adverse outcomes (birth defects).
- Must balance risk to the mother of untreated depression.

JAMA 2013;309:48

PRETERM BABIES

Do fresh (<7 days) vs. older RBC's affect infection or organ dysfunction in preterm NICU babies requiring transfusion?

- 77.7% vs. 77.2% had infection (NS)
- 67.5% vs. 64.0% had + cultures (NS)
- 52.7% vs. 52.9% had composite of other morbidities (NS)

JAMA 2012;308:1443

TERATOGENICITY

Database review of women taking NSAIDs during pregnancy:

- 22% used NSAIDs in first trimester; mainly ibuprofen, aspirin, naproxen
- No association with most defects
- Small ↑ risk of a few specific defects

Am J Obstet Gynecol 2012;206:228

TERATOGENICITY

Washington State database review of illicit and prescription maternal drug use:

- Rates ↑ from 2000→2008; mainly opioids
- Neonatal withdrawal 3.3 / 1000 births
- Newborns had lower birth weight, longer hospitalizations, more preterm births, feeding difficulties and respiratory issues.

Obstet Gynecol 2012;119:924

ANESTHETIC TOXICITY

Do children exposed to anesthesia in infancy have deficits in school performance?

- Mean composite scores on academic achievement tests did not appear different.
- However, 14% scored below 5th %ile, even when other CNS problems or risk factors during infancy could be ruled out.
- Negative association between duration of anesthesia and test scores (longer=lower).

Anesthesiology 2012;117:494

TERATOGENICITY

A cost-benefit analysis for prenatal intervention to stop substance abuse in pregnancy (Early Start) was performed:

- Higher costs if screens positive without follow-up for mothers and infants.
- Early Start implementation = \$670,000
- Net cost benefit = \$5,946,741

Obstet Gynecol 2012;119:102

ANESTHETIC TOXICITY

How do we interpret observational studies?

- What is the population receiving anesthesia?
- Who is actually included in the analysis?
- What is the definition of anesthetic exposure?
- What is the comparison group?
- What is the outcome measure?
- How are the data analyzed?
- What is the clinical relevance?

Anesthesiology 2012;117:459

TERATOGENICITY

Parental characteristics and risks to child:

- Maternal obesity → autism
Pediatrics, May 2012
- Paternal job using solvents → anomalies
Occup Environ Med, July 2012
- Maternal smoking → poor asthma control
J Allergy Clin Immunol 2012

ANESTHETIC TOXICITY

Analysis comparing 321 children age 10 who were exposed to anesthesia under age 3:

- Battery of neuro-psych tests administered.
- ↑ language disability (RR 1.87)
- ↑ abstract reasoning deficits (RR 1.69)
- Disability in language and cognition (RR 2.41)
- Risks persisted even with only 1 exposure.

Pediatrics 2012;130:476

ANESTHETIC TOXICITY

Summary of what we know:

- Single anesthetics may not have an effect.
 - Repeated exposures do show an effect.
 - Persists after adjustments for co-morbidity.
 - Learning (reasoning), speech and language are affected but not behavior.
 - Observational studies are prone to bias, confounding, etc. but RCTs for this question are not possible or ethical. Prospective trials are ongoing.
- AAP 2012 Nat'l Conference / Medscape, 10/25/12

ANESTHETIC TOXICITY

What about exposure of the fetus in-utero?

- Non-obstetric surgery and fetal interventions often use GETA, high concentrations, longer than C/S, and all lipophilic anesthetics can be measured in the fetal brain.
- 2nd trimester: rapid fetal brain development
- Animal exposure → neuronal cell death and behavioral abnormalities.

Int J Obstet Anesth 2012;21:152

**AND WE'LL SEE WHAT'S
NEW IN 2013!**

THE END

