Cutting the cord: Management of the third stage

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So, what about the third stage?

• “This is indeed the unforgiving stage of labor, and in it there lurks more treachery than in both the other stages combined. The normal case can, within a minute, become abnormal and successful delivery can turn swiftly to disaster.”

Ian Donald, Practical Obstetrics Problems, 1978

Definition

• Follows completed delivery of the newborn until completed delivery of the placenta
So, what about the third stage?

- 8% of maternal deaths in the US
  - 3rd leading cause after thromboembolic events and hypertension
- 24% of maternal deaths in the developing world
  - Accounts for 100,000 deaths/year
- Affects length of stay, need for transfusion, breastfeeding initiation

- Less research attention
- Less consensus
  - Winter et al. BJOG, 2007
  - Wide variation in practices based on survey data from 14 European countries
  - However, compelling evidence present

Objectives

- Options for management of the third stage
  - Active versus expectant management?
  - Delayed cord clamping?
- Complications of the third stage
  - Retained placenta
  - Uterine inversion
  - Postpartum hemorrhage

Physiology

- Myometrial contraction, reduction in basal blood flow
- Thickening and reduction in the surface area of the myometrium underlying the placenta
- Uppermost portion of the placenta detaches last
- Expulsion from the uterus

Herman et al. Ultrasound in Obstetrics and Gynecology, 2002
Physiology

- Average length 5-6 minutes
- 90% delivered within 15 minutes
- 97% delivered within 30 minutes
- Preterm delivery associated with prolonged third stage
- Longer third stage increases the likelihood of postpartum hemorrhage

Management of the third stage

- Active versus expectant management:
  - Prendiville et al, Cochrane, 1997
    - 5 trials included
    - Reduction in PPH (RR 0.38)
    - Increase in maternal nausea (RR 1.83)
    - Neonatal effects not assessed
  - Rogers et al, Lancet, 1998
    - 1512 women
    - Reduction in PPH
    - More vomiting in the active management group
  - Definition of active management varies by provider

Management of the third stage
What interventions do you use in the third stage?

1. Early cord clamping
2. Fundal massage
3. Controlled cord traction
4. Administration of a uterotonic
5. None of the above

Active Management

- Early cord clamping?
- Controlled cord traction?
- Cord drainage?
- Administration of a uterotonic agent?
Early cord clamping

- McDonald et al, Cochrane, 2008
  - Meta-analysis of 11 trials
  - No significant change in postpartum hemorrhage
  - More to come re: neonatal effects

Controlled cord traction

- No studies evaluating this intervention alone
  - Sharma et al, 2005
  - Comparison with umbilical cord drainage
  - Umbilical cord drainage led to shorter third stage
  - No difference in retained placenta or PPH
- Recommended by FIGO as part of the Safe Motherhood initiative

Controlled cord traction

- Recommended technique
  - Apply counterpressure above the pubic symphysis
  - Gentle downward traction on cord
  - Await uterine contraction
  - Gently pull downward for 30-40 seconds
  - If the placenta does not deliver, keep slight tension on the cord, but do not pull until the next contraction

Cord drainage

- Three randomized trials
  - Sharma et al, 2005
    - 958 women with low risk pregnancies
    - Reduction in length of third stage- 3 minutes vs 6-8 minutes
  - Giacalone, BJOG 2000
    - 447 women with low risk pregnancies
    - Cord immediately clamped, divided, and then unclamped
    - Reduction in retained placenta
  - Razmkhah, 1999
    - 147 women with low risk pregnancies
    - Reduction in length of third stage
Uterotonics

• Oxytocin
  ▪ Cotter et al, 2001
  ▪ 7 trials, >3000 women
  ▪ Reduction in PPH (RR 0.50)
  ▪ Evidence regarding timing is unclear: with delivery of anterior shoulder versus after delivery of placenta
  ▪ Bolus more effective than slow infusion
  ▪ 10 IU IM if IV access not available

Uterotonics

• Prostaglandins
  ▪ Gulmezoglu et al, Cochrane, 2007
  ▪ Oral or sublingual misoprostol superior to placebo for preventing PPH
  ▪ Side effects: shivering, fever
  ▪ Injectable uterotonics preferable

Uterotonics

• Ergot alkaloids (Methergine)
  ▪ Liabsuetrakul et al, Cochrane, 2007
  ▪ Reduction in blood loss
  ▪ Increase in retained placenta
  ▪ Increased vomiting, hypertension, pain
  ▪ Side effects worst with IV administration

Management of the third stage

• Active management reduces blood loss and post partum hemorrhage
• Components of active management include:
  ▪ Controlled cord traction
  ▪ Administration of a uterotonic
  ▪ Pitocin is the optimal uterotonic
Timing of cord clamping

When do you clamp the umbilical cord?

1. Immediately after delivery (5-10 seconds)
2. 2-3 minutes after delivery
3. When the cord stops pulsing
4. With delivery of the placenta

![Graph showing timing preferences with percentages: 33%, 32%, 32%, 3%]

Delayed cord clamping

- Meta-analysis of 15 trials
  - Included both RCT and non-randomized
- Late cord clamping delayed for at least 2 minutes
  - Improved hematocrit (RR 3.70)
  - Reduction in anemia (RR 0.53)
  - Increase in asymptomatic polycythemia (RR 3.82)
- Unable to assess effect on maternal outcomes

Average of 25-60% of combined fetal-placental circulation is in the placenta at the time of delivery.
Cord clamping within 5-10 seconds results in a decrease in blood volume of 20-40 mL/kg body weight.

Delayed cord clamping

- Position of infant
  - Below introitus to facilitate transfusion

JAMA, March 2007
Delayed cord clamping

- Preterm infants (<37 weeks)
  - 7 studies, 297 infants
  - Delayed for 30 to 120 seconds
  - Reduced transfusions
  - Reduced hypotension
  - Reduced IVH
- Requires discussion with pediatric team

Timing of cord clamping

- Delay of cord clamping for 30-120 seconds after delivery leads to decreased neonatal anemia in the first 6 months of life without clear adverse effects
- Need for resuscitation should dictate timing

Complications of the third stage

- Retained placenta
- Uterine inversion
- Postpartum Hemorrhage

Retained placenta

- 1/100 to 1/200 deliveries
- Retained or partially detached placenta interferes with uterine contraction, increasing bleeding
- Risk increases with length of the third stage
Pharmacologic management

- IV nitroglycerin, 50 to 200 mcg, to relax the uterus-monitor for drop in BP
- Intraumbilical injection of oxytocin
  - Carroli et al, Cochrane, 1999
  - 12 trials
  - RR 0.79, Number needed to treat: 8
  - Multiple dosing regimens, example: 20 IU in 20 cc NS
- Prostaglandins injected intraumbilically also effective

Manual removal

- Anesthesia may be required
- Develop a plane between the placenta and the uterus
- No data from randomized trials to support or refute the use of prophylactic antibiotics, but aseptic technique is impossible -> 1 dose of broad spectrum antibiotics

Uterine inversion

- Uterine fundus collapses into the endometrial cavity
  - <1/6000 deliveries
  - Causes: Excessive cord traction, fundal pressure in the setting of a fundal placenta
  - Risk factors: macrosomia, short cord, uterine anomalies, placenta accreta
  - Clinical diagnosis
  - Can lead to hemorrhage, shock

Uterine inversion

- Get help- anesthesia, additional OB, RN
- Large bore IV access
- Withhold uterotonics
- Myometrial relaxation
  - Nitroglycerin
  - Magnesium
  - Terbutaline
  - Inhalational anesthesia
Uterine inversion

- Hydrostatic pressure
  - Bag of warmed fluid hung above the patient and allowed to flow into the vagina
  - Practitioners hands or silicone cup of vacuum extractor used to contain water within the vagina
  - Hydrostatic pressure replaces the inverted fundus

- Surgical correction
  - Huntington procedure: Clamps placed on the round ligaments and in the depression created by the inversion, gentle traction applied
  - Haultain procedure: Incision in the posterior aspect of the inverted uterus to allow replacement

- Following replacement, administer uterotonics and hold uterus in place until contraction occurs
- Risk of recurrence unclear
Postpartum Hemorrhage
• 1-5% of all deliveries
• Definitions:
  ▪ >500 cc for vaginal delivery, > 1000 cc for cesarean delivery
  ▪ Blood loss generally underestimated, routine EBL likely 400-600 cc for vaginal delivery, 1000 cc for cesarean delivery
  ▪ 10% decline in hemoglobin
  ▪ Diagnosis must be made prior to laboratory changes
  ▪ Clinical diagnosis by signs or symptoms of hypovolemia

Postpartum Hemorrhage
• Etiology
  ▪ Atony
  ▪ Atony
  ▪ Atony
  ▪ Trauma
  ▪ Coagulation defects

Postpartum Hemorrhage
• Pharmacologic interventions
  ▪ Oxytocin 40 units in 1 liter NS or 10 IU IM or intramyometrial
  ▪ Methylergonovine 0.2 mg IM or intramyometrial, repeat q2-4 hours
    ▪ Contraindication: Hypertension, Raynaud’s
  ▪ Hemabate 250 mcg IM or intramyometrial, repeat q15-90 minutes x 8 doses
    ▪ Contraindication: Asthma
  ▪ Misoprostol 1000 mcg PR

Postpartum Hemorrhage
• Aggressive fluid resuscitation
  ▪ 3:1 crystalloid for blood loss
  ▪ Transfuse PRBC if unresponsive to 2-3 L crystalloid or ongoing bleeding
Postpartum Hemorrhage

- Blood products
  - 1 U PRBC = 200-250 cc = 1 hct 3 points
  - 1 U FFP = 200-300 cc = 1 fibrinogen 7-10 mg/dL
  - 1 U Cryoprecipitate = 10-15 mL = 1 fibrinogen ~5 mg/dL
  - 1U Platelets = 50 cc = 6U will ↑ platelet count by 30,000
- Unclear what plasma/PRBC ratio should be
  - Recent data suggest more aggressive plasma transfusion is beneficial

Postpartum Hemorrhage

- Adequate visualization
- Repair of lacerations
- Remove retained products of conception
- Uterine tamponade
  - Bakri balloon
  - Uterine packs
    - Remove within 24 hours
    - Antibiotic prophylaxis

Postpartum Hemorrhage

- Arterial embolization
- Laparotomy
  - B-Lynch
  - Uterine artery ligation
  - Hysterectomy
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  - Delayed cord clamping?
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Objectives

- Options for management of the third stage
  - Active versus expectant management
  - Delayed cord clamping
    - Beneficial for term and preterm infants
    - Compatible with active management strategies
- Complications of the third stage
  - Retained placenta
  - Uterine inversion
  - Postpartum hemorrhage

Objectives

- Options for management of the third stage
  - Active versus expectant management
  - Delayed cord clamping
- Complications of the third stage
  - Retained placenta
  - Nitroglycerin
  - Intraumbilical Pitocin
  - Manual extraction
  - Uterine inversion
  - Postpartum hemorrhage
Objectives

- Options for management of the third stage
  - Active versus expectant management
  - Delayed cord clamping
- Complications of the third stage
  - Retained placenta
  - Uterine inversion
  - IV access
  - Uterine relaxation
  - Uterine replacement
  - Uterotonics
  - Postpartum hemorrhage

Objectives

- Options for management of the third stage
  - Active versus expectant management
  - Delayed cord clamping
- Complications of the third stage
  - Retained placenta
  - Uterine inversion
  - Postpartum hemorrhage
  - IV access and resuscitation
  - Uterine massage
  - Uterotonics
  - Repair lacerations
  - Packing/Uterine Balloon
  - Arterial embolization
  - Laparotomy/Hysterectomy

Thank you