CASE PRESENTATION: UTERINE INVERSION

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DISCLOSURES
We have no financial interest in any commercial entities who could benefit financially from views expressed herein.

WHAT IS UTERINE INVERSION?

- Uterine inversion occurs when the uterine fundus collapses into itself, turning the uterus partially or completely inside out.
- Incomplete
  - The fundus is within the endometrial cavity
- Complete
  - The fundus protrudes through the cervical os
UTERINE INVERSION THROUGH HISTORY

Hippocrates: “vehit scrotum”

Historical “causes” for inversion: vomiting, sneezing, straining, “loaded intestines,” short umbilical cord, heavy placenta, delivery from the upright position, neurosis, emotional excitement, and fatigue

“In the majority of instances, some act of violence, such as an improper method of expressing the placenta or deliberate traction on the umbilical cord, has been found to be directly responsible.”
- Probodh Das, British Journal of Obstetrics and Gynaecology, 1940

YALE NEW HAVEN HOSPITAL
LABOR AND BIRTH

CASE STUDY:

PATIENT HISTORY

- 21yo G2P0010 at 41w2d GA
- No past medical or surgical history
- Obstetrical History: TAB 1/11
  - managed medically in first trimester
- Social History: no tobacco, alcohol, drugs; FOB involved
- Meds: Prenatal vitamins
- Allergies: sulfa
Prenatal care: began at 8 weeks GA
Prenatal labs:
- O+/ Antibody-  
- Rubella Immune  
- VDRL NR  
- GC/CT neg  
- HIV neg  
- HepBsAg neg  
- 1hr GTT WNL  
- GBS neg
Pre-pregnancy BMI: 18.9 kg/m²
SVE in office (2 days prior): 4/100/-2

PRENATAL COURSE

PATIENT HISTORY

- Scheduled for post-dates induction
- Spontaneous labor at home night before Induction
- SROM 5:38 am

Are we worried about this labor and birth?
INITIAL ASSESSMENT

- 05:38 SROM clear fluid
- 05:55 Admitted to Labor and Birth
  - Patient complaining of intense rectal pressure.
- 06:10 Vitals:
  - Temp 98.6°F
  - HR 77
  - RR 19
  - BP 131/89
- Category I fetal heart rate tracing
- Contracting 5 times per 10 min
- Vaginal exam: Fully dilated, 0 station

SECOND STAGE

- 6:11 am: Began pushing
- 6:16 am: Set up for delivery
- 6:21 am: Spontaneous Vaginal Birth to female infant with Apgars 9, 9

THIRD STAGE

- 6:21 am: Umbilical cord drained while awaiting placental delivery
- 6:30 am: Partial cord avulsion noted during controlled downward pressure of cord
- 6:33 am: 10U IM oxytocin given (no IV access)
- 6:39 am: Placental delivery via manual extraction with fundal pressure, trailing membranes noted
POSTPARTUM HEMORRHAGE

- 06:50 - Continued brisk bleeding, concern for retained membranes
  - VS: T 98.2°F / P 78 / RR 19 / BP 93/52
  - IV, 18 gauge placed and 30U IV oxytocin given

- 06:53 - Patient with pallor, lethargy
  - VS: P 107 / RR 19 / BP 70/24
  - Patient very uncomfortable, unable to tolerate exam for removal of membranes
  - Requested anesthesia evaluation
  - Plan for curettage

- 07:14 Transferred to OR, diaphoretic, pale, and weak

PREPARATIONS

- Call to Blood bank for massive transfusion
- Second RN assigned to patient
- Second #18 gauge IV inserted
- Third #14 gauge IV inserted
- Foley catheter inserted

DX: UTERINE INVERSION

07:14 In OR. Conscious sedation and antibiotics

- Speculum exam: minimal membranes noted, cervix is not visible
- Bimanual exam: inverted uterus, fundus high in vagina
- TAUS:

Image from Momin et al, J Clin Ultra., 2009
REPLACEMENT OF INVERTED UTERUS

- Nitroglycerine given
  - 2 failed attempts at manual replacement
- General anesthesia given (with intubation)
  - Successful manual replacement from below
- Atony improved with misoprostol 1000 mcg rectally and fundal massage
- Ultrasound confirmed replacement and thin endometrial stripe
- Noted to have ST depression on telemetry

PACU

- 09:51 Transferred to PACU on Labor and Birth unit
- Stat labs every 4-6 hours (CBC, cardiac, coags)
- Continuous monitoring of VS
- Frequent assessment of fundus and bleeding
- Cardiology consult
- Cardiac echo performed, within normal limits
- Infant brought to PACU to nurse
- 21:35 Transferred to MSCU for continuous cardiac telemetry

CONSEQUENCES OF INVERSION

Hemorrhage/large volume resuscitation
- EBL: 3L
- Products given: 5 U pRBCs, 3 U FFP
- Fluids given: 3000cc LR, 1000cc NS, 500cc Hextend

<table>
<thead>
<tr>
<th>Event</th>
<th>Hematocrit</th>
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<tbody>
<tr>
<td>Immediately postpartum, before OR</td>
<td>32.7 % (formal)</td>
</tr>
<tr>
<td>In OR, pre-procedure</td>
<td>24 % (i-STAT)</td>
</tr>
<tr>
<td>After uterine replacement</td>
<td>14 % (i-STAT)</td>
</tr>
<tr>
<td>After uterine replacement</td>
<td>17.0 % (formal)</td>
</tr>
<tr>
<td>After transfusion of 5 U pRBC + 3 U FFP</td>
<td>30.4 % (formal)</td>
</tr>
</tbody>
</table>
CONSEQUENCES OF INVERSION

ST changes
- ST depression: in lead II x 2hrs
- Troponin: mild leak to 0.02 mcg/L, but subsequently < 0.01 mcg/L
- Cardiology consult: attributed ST changes to demand ischemia, secondary to hypovolemia
- PP ECG: ST changes resolved
- Echo PPD #0 in PACU:
  - normal systolic & diastolic function

POSTPARTUM COURSE

PPD # 1: VSS, fundus firm, Hct 29%, ECG NSR
PPD # 2: VSS, fundus firm
PPD # 3: stable, d/c home
PPD # 4: returned to ED with c/o chest pain
  - VSS, Hct 32%, ECG NSR, CXR neg, CTPE neg

6 weeks PP: normal exam at PP visit
8 weeks PP: cardiology f/u, repeat echo stable

SUMMARY

21yo G2P1011 s/p precipitous NSVD at 41w2d complicated by postpartum hemorrhage secondary to uterine inversion.
Incidence: 1 in 1200 to 1 in 57,000
Mortality rate: 13% to 41%, mostly in resource poor settings
Risk factors: Present in fewer than 50% of cases
- primiparous
- protracted labor
- placental problems
- short cord
- fundal placenta
- uterine atony
- weakening of uterine wall or cervix
- prior uterine inversion
- manual removal of placenta
- mismanagement of third stage
- macrosomia

Acute vs chronic
Complete vs Incomplete

Symptoms:
- hemorrhage
- sudden acute pelvic pain
- hypotension
- tachycardia
- tachypnea
- pallor
- diaphoretic
- overall anxiety/restlessness
Physical exam

- **Abdomen**: displaced/unable to palpate fundus, possible cuplike depression
- **Vaginal**: visualize uterus at introitus, palpate bleeding mass in vagina
- **Ultrasound**

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**UTERINE INVERSION ON ULTRASOUND: SAGITTAL**

Image from Pauleta et al., Ultrasound Obstet Gynecol, 2010

Image from Smulian et al., J Clinical Ultrasound, 2013

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**UTERINE INVERSION ON ULTRASOUND: AXIAL**

Image from Pauleta et al., Ultrasound Obstet Gynecol, 2010

Image from Momin et al., J Clin Ultra., 2009
INITIAL NURSING RESPONSIBILITIES
- Remain calm
- Call in emergency resources
  - OB team
  - Anesthesia team
  - OR team
- Notify blood bank (massive transfusion)
- Ensure IV access- 2 large bore IV
- Monitor VS for signs of hypovolemia (T,P,R,BP)
- Assist with transfer to OR

MANAGING UTERINE INVERSION
- Treat shock/hemorrhage with fluid resuscitation and transfusions
- Withhold uterotonics and fundal massage until uterus replaced
- Uterine replacement
  - Pain management/anesthesia
  - Tocolytics: terbutaline, magnesium sulfate, nitroglycerine, halogenated general anesthetics
  - Manual vs surgical replacement
MANUAL REPLACEMENT OF INVERTED UTERUS

SURGICAL REPLACEMENT OF INVERTED UTERUS

AFTER UTERINE REPLACEMENT

- Uterotonics and fundal massage to prevent re-inversion
- Ultrasound confirmation of replacement
POST REPLACEMENT MONITORING

- Close observation of VS Q 15 min
- Fundal assessment Q 15 min X 1 hour, then Q 30min until stable
- Reassess CBC
- Transfuse as necessary based on hematologic status

PATIENT/FAMILY DEBRIEFING

- Discuss what happened, include predisposing risk factors, possible causes
- Assess patient/family’s understanding of situation, allowing time for questions
- Encourage patient/family to express fears and concerns
- Discuss any long term implications of the inversion and hemorrhage

MULTIDISCIPLINARY DEBRIEFING

- Discuss events in factual way including timeline
- Allow staff members to express feelings about the event
- Discuss what was done well
- Discuss what can be improved upon
What can we do to prevent uterine inversion?

PREVENTION STRATEGIES

- Management of 3rd stage
  - Signs of separation
    - Gush of blood
    - Spontaneous lengthening of cord
    - Fundus rises up and contracts
  - Active Management
    - Consider prophylactic oxytocin
    - Controlled downward pressure on cord
    - Uterine massage

SUMMARY: UTERINE INVERSION

- Uterine inversion is an obstetrical emergency that can lead to significant blood loss.
- Prompt recognition and management of uterine inversion is essential for reducing morbidity and mortality.
- Tocolytics and anesthetics can facilitate uterine replacement.
- If manual replacement of the uterus fails, surgical intervention is needed.
- Management of 3rd stage is key for prevention.
- Remember to support family and staff.
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QUESTIONS?