#NewWorldProblems

**Obesity in Pregnancy**

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USC SOM

**Disclosures**

- None to Disclose

**Objectives**

- Discuss the epidemiology of obesity
- Review the effects on pregnancy in the obese patient
- Suggest ways to optimize the care of the obese patient, including:
  - Weight gain recommendations
  - Intrapartum Care
  - Post-operative Considerations
  - Postpartum Care
Definitions

<table>
<thead>
<tr>
<th>Category</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Less than 18.5</td>
</tr>
<tr>
<td>Normal Weight</td>
<td>18.5-24.9</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
</tr>
<tr>
<td>Obesity Class I</td>
<td>30.0-34.9</td>
</tr>
<tr>
<td>Obesity Class II</td>
<td>35.0-39.9</td>
</tr>
<tr>
<td>Obesity Class III</td>
<td>40 or greater</td>
</tr>
</tbody>
</table>


Epidemiology

• Based on the 2011-2012 National Health & Nutrition Examination Survey
  • 31.8% of 20-39 year old women are obese
  • 58.5% of these women are either obese or overweight

• Data is concerning
  • Prevalence increased between 1999-2010
    • 28.4→34%
  • Higher prevalence of Class II & III Obesity in 2009-2010
    • Class II 17.2%
    • Class III 7.5%
Effects on Pregnancy

- Pregnancy Loss
- Antepartum Complications
- Intrapartum Complications
- Postpartum Complications
- Fetal Complications & Childhood Morbidities

Pregnancy Loss

- Spontaneous abortion
  - Odds Ratio 1.2
- Recurrent Miscarriage
  - Odds Ratio 3.5
- Other increased risks:
  - Neural tube defects
  - Hydrocephaly
  - CV, orofacial, & limb reduction anomalies

Table 2. Increases in Congenital Anomalies in Obese Versus Nonobese Gravidas

<table>
<thead>
<tr>
<th>Congenital Anomaly</th>
<th>Increased Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neural tube defects</td>
<td>OR, 1.87; 95% CI, 1.62–2.15</td>
</tr>
<tr>
<td>Spina bifida</td>
<td>OR, 2.24; 95% CI, 1.86–2.69</td>
</tr>
<tr>
<td>Cardiovascular anomalies</td>
<td>OR, 1.30; 95% CI, 1.12–1.51</td>
</tr>
<tr>
<td>Septal anomalies</td>
<td>OR, 1.20; 95% CI, 1.09–1.31</td>
</tr>
<tr>
<td>Cleft palate</td>
<td>OR, 1.23; 95% CI, 1.03–1.47</td>
</tr>
<tr>
<td>Cleft lip and palate</td>
<td>OR, 1.20; 95% CI, 1.03–1.40</td>
</tr>
<tr>
<td>Anorectal atresia</td>
<td>OR, 1.48; 95% CI, 1.12–1.97</td>
</tr>
<tr>
<td>Hydrocephaly</td>
<td>OR, 1.68; 95% CI, 1.19–2.36</td>
</tr>
<tr>
<td>Limb reduction anomalies</td>
<td>OR, 1.34; 95% CI, 1.03–1.73</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; OR, odds ratio.
Antepartum Complications

- Cardiac Dysfunction
- Proteinuria
- Sleep Apnea
- Non-alcoholic fatty liver disease
- Gestational Diabetes Mellitus
- Pre-eclampsia
- Intrauterine fetal demise

RESEARCH

Obesity and the risk of stillbirth: a population-based cohort study

Renaud Tav, MD, MPH, Carol V. Amsel, PhD, MPH, Ina V. Feck, MPH, Laurence Prenio, MD, Laurea A. Pfeuto, MD MPH, for the Perinatal Research Consortium
Risk of Stillbirth by Gestational Period

Risk of Stillbirth for Remaining Pregnancies

Intrapartum Complications

- Increased association with:
  - Indicated preterm birth

- Increased risk of:
  - Cesarean delivery
  - Failed trial of labor
  - Endometritis
  - Wound rupture/dehiscence
  - Venous thrombosis
Postpartum Complications

- 46% of obese pregnant patients gain weight in excess of IOM recommendations
  - Excess weight gain is a significant risk factor for postpartum weight retention
- Pre-pregnancy obesity is associated with:
  - Early termination of breastfeeding
  - Postpartum anemia
  - Depression

Fetal Complications & Childhood Morbidities

- Macrosomia
- Impaired growth
- Metabolic syndrome & child obesity
- Asthma
- Altered behavior including
  - Autism spectrum disorders
  - Childhood developmental delay
  - Attention-deficit/hyperactivity disorders

How We Can Help

- Prevention is KEY!!
  - Preconceptual counseling is imperative
  - Weight loss before pregnancy can improve medical comorbidities
  - Either surgical or nonsurgical
  - Even a weight loss of 5-7% over time can improve metabolic health
  - Motivational interviewing techniques
  - Referral to intensive multicomponent behavioral interventions if BMI>30.
How We Can Help

- Weight loss efforts
  - Should NOT involve medications if conception is being attempted or during pregnancy
  - Weight management strategies during pregnancy include:
    - Dietary control
    - Exercise
    - Behavior modification

IOM Weight Gain Recommendations

<table>
<thead>
<tr>
<th>Pregnancy Weight Category</th>
<th>Body Mass Index*</th>
<th>Recommended Range of Total Weight Gain (lbs)</th>
<th>Recommended Rates of Weight Gain in the Second and Third Trimesters (lbs/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Less than 18.5</td>
<td>28–40</td>
<td>0.5–1.0</td>
</tr>
<tr>
<td>Normal weight</td>
<td>18.5–24.9</td>
<td>25–35</td>
<td>0.6–1.2</td>
</tr>
<tr>
<td>Overweight</td>
<td>25–29.9</td>
<td>15–25</td>
<td>0.6 (0.5–0.7)</td>
</tr>
<tr>
<td>Obese (includes all classes)</td>
<td>30 and greater</td>
<td>11–20</td>
<td>0.5 (0.4–0.6)</td>
</tr>
</tbody>
</table>

*Body mass index is calculated as weight in kilograms divided by height in meters squared or as weight in pounds multiplied by 703 divided by height in inches.

Intrapartum Care

- Things to keep in mind:
  - Increasing BMI is associated with longer labor
  - Patients with Class III Obesity undergoing TOLAC:
    - Increased morbidity
    - Increased neonatal injury
    - Fractures, brachial plexus injuries, lacerations
    - Have a significantly increased risk of postpartum uterine bleeding after vaginal delivery
  - Prolonged hospital stay, endometritis, rupture/dehiscence
  - Increased morbidity
  - Prolonged hospital stay, endometritis, rupture/dehiscence
  - Increased neonatal injury
  - Fractures, brachial plexus injuries, lacerations
  - Patients with Class III Obesity
  - Have a significantly increased risk of postpartum uterine bleeding after vaginal delivery
Intrapartum Care

- Things to keep in mind:
  - There is an inverse relationship between pre-pregnancy BMI & Success Rates for VBAC

<table>
<thead>
<tr>
<th>BMI</th>
<th>VBAC Success Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;19.8</td>
<td>83.1</td>
</tr>
<tr>
<td>19.8 – 26</td>
<td>79.9</td>
</tr>
<tr>
<td>26.1 – 29</td>
<td>69.3</td>
</tr>
<tr>
<td>&gt;29</td>
<td>68.2</td>
</tr>
</tbody>
</table>

- Risk of Cesarean section increases with BMI

<table>
<thead>
<tr>
<th>Odds Ratio for Cesarean Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight</td>
</tr>
<tr>
<td>Obese</td>
</tr>
<tr>
<td>Severely Obese</td>
</tr>
</tbody>
</table>

Operative & Perioperative Considerations

- Anesthesia consultation
  - Preferably pre-labor or in early labor
  - To develop a plan for:
    - Proper equipment for BP monitoring
    - Venous access
    - The influence of other comorbid conditions
    - To decide on the mode of anesthesia
Operative & Perioperative Considerations

• Epidural or Spinal Anesthesia
  - Recommended for intrapartum pain relief but may be technically difficult
  - Body habitus
  - Loss of landmarks
  - Risk of epidural analgesic failure is greater in obese women compared with normal & overweight women

Dresner M, Brocklesby J, Bamber J. Audit of the influence of body mass index on the performance of epidural analgesia in labour and the subsequent mode of delivery. BJOG 2006;113:1178-83.

Operative & Perioperative Considerations

• Side effects increased
  - Epidurals placed result in significantly greater:
    • Hypotension
    • Prolonged fetal heart rate decelerations
    • Spinal anesthesia & obesity impairs respiratory function for up to 2 hrs after the procedure
  - General Anesthesia risks
    • Difficulty ET placement due to excessive tissue & edema


Operative & Perioperative Considerations

• Prophylactic antibiotics for cesarean
  - Definitive recommendations are not yet established, but...
  - Higher doses recommended by some
    • If >80 kg (175 lb)
      - 2g Cefazolin dose
    • If >120 kg (265 lb)
      - 3g Cefazolin
Operative & Perioperative Considerations

- Incision
  - Vertical vs. Transverse
  - Data is conflicting
  - Supraumbilical?
  - May benefit women with a large panniculus
  - Subcutaneous drain or no drain?
  - Drains increase the risk of postpartum cesarean wound complications
  - Closure of the subcutaneous tissue?
  - If >2cm of subcutaneous tissue, closure significantly decreases the incidence of wound disruption

Postpartum Care

- Risks to think about
  - VTE
  - Surgical site infection

- VTE
  - Case-control study in Denmark
  - >71,000 women
  - Obesity in early pregnancy associated with an increased risk of VTE
  - OR 5.3

Postpartum Care

- VTE prophylaxis
  - Pneumatic compression devices
  - Before AND after cesarean delivery
  - Consider use during induction
  - Early mobilization
  - Consider pharmacologic prophylaxis in very high risk groups
  - Low Molecular Weight Heparin 40 mg daily
  - The benefits of weight-based vs. BMI stratified dosage strategies not yet clear

Postpartum Care

- Surgical Site infection
  - Baseline risk of infection based on a retrospective study of 2492 cesarean deliveries
    - 18%
  - Compared to normal-weight women...

<table>
<thead>
<tr>
<th>BMI</th>
<th>Risk of surgical site infection (Odds Ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight</td>
<td>1.6</td>
</tr>
<tr>
<td>Obesity Class I</td>
<td>2.4</td>
</tr>
<tr>
<td>Obesity Class II &amp; III</td>
<td>3.7</td>
</tr>
</tbody>
</table>


Postpartum Care

- Surgical Site infection management
  - Antibiotics
    - May use alone if infection is superficial
  - Exploration
  - Debridement

- Closure of the resulting open wound
  - Secondary closure
  - Secondary intention with dressings
  - Secondary intention using negative pressure wound therapy
Nursing Considerations for the Pregnant Obese Patient

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Clinical Practice Specialist
Women’s and Neonatal Services
Palmetto Health Richland

Intrapartum Nursing Considerations

- Notification from the OB provider of services needed by at least 34 weeks gestation
  - Will allow adequate time for staffing and ordering of equipment, if needed
  - Notification may also give facility the opportunity to reveal if patient’s needs may be better served at tertiary facility
- Questions for the facility’s leadership team:
  - What is the best location for patient’s care?
  - Can the facility manage these special needs?
  - Is referral to a tertiary or other center necessary?

Intrapartum Nursing Considerations

- Additional staff needed for:
  - Transferring
  - Positioning and turning
  - Assisting with legs during procedures
  - Catheterization
  - Internal monitors
  - Active pushing phase of 2nd stage labor
  - Both mother’s safety and staff’s safety
**Equipment**

- Bariatric bed
  - Labor
  - Postpartum
- Lift equipment
- Hoe or tray to assist with transfer after regional anesthesia
- Bedside commode/toilet
- Extra large gowns
- Blood pressure cuffs
- Extra large SCDs
- Bariatric wheelchair
- Method to weigh patient
- OR table with 1000 lb capacity
- Extension devices to increase width of table
- Extra-long surgical instruments and retractors
- Staff will need time to become and practice with unfamiliar equipment
- Contact information for equipment suppliers for each item needed should be maintained in a file and readily available to leadership team

**Intrapartum Nursing Considerations**

- IV access
  - Consider central line or 2 peripheral lines
- External fetal monitoring
  - 1:1 care may be necessary
  - May need a nurse dedicated to holding external monitors
  - Maternal heart rate vs. fetal heart rate
  - Low FHR baseline
  - Maternal pushing efforts during 2nd stage
  - Maternal repositioning
  - Maternal body habitus
  - Maternal tachycardia a/w temperature/anxiety/meds
  - FHR accelerations consistently coinciding with contractions or with pushing should be evaluated

**Intrapartum Nursing Considerations**

- More likely to have IOL or AOL
- 2x the rate of failure of IOL
- Labor proceeds more slowly as BMI increases
  - Allow longer time for labor
- Uterine contractility may be diminished
  - Anticipate high doses of pitocin
  - Does your facility require at bedside evaluation of the FHR at any specific dose of pitocin?
Intraoperative Nursing Considerations

- Decision to incision time intervals may be longer
  - Anesthesia, transport to OR, and transfer to table difficulties
- Incision to birth time intervals may be longer
  - Excessive adipose tissue

Intraoperative Nursing Considerations

- Prophylactic antibiotics especially important d/t increased risk for SSI and endometritis
- Incision direction based on individual clinical situations and surgeon preference
- Positioning
  - Panniculus retractor
  - Silk tape
- Normothermia in the OR

Postpartum Nursing Considerations

- Consider PACU or ICU for 24hrs p/c c-section
- End tidal CO2 monitoring during postoperative pain relief with narcotics
- Wound assessment
- Incentive spirometry to prevent respiratory complications
- Accurate and timely VS and I/O
- Bleeding - quantify blood loss
- Uterine tone difficult to assess; risk for PPH
  - Consider prophylactic use of uterotonic
- Use of SCDS continued until fully ambulatory and then even during rest periods in bed
Infant Feeding Considerations

- Obese patients are less likely to initiate breastfeeding and those that do are more likely to breastfeed for less time than their thinner counterparts
- Breastfeeding should be encouraged for maternal and neonatal benefits
  - Maternal benefit: increased weight loss following delivery
  - Neonatal benefits: decreased risk of childhood obesity and type 2 diabetes
- Risk for delayed lactogenesis (more than 72hr after birth)
- Need for outpatient lactation services
  - Referral to appropriate facility or private IBCLC

General Nursing Considerations

- Environment
  - Should be sensitive and empathetic
  - Avoid reminding the patient that additional clinical issues are r/t obesity
  - Focus of care should be safety and clinical needs

Table 12-3. Obesity-Related Peripartum Complications and Possible Interventions

<table>
<thead>
<tr>
<th>Obesity-Related Peripartum Complications</th>
<th>Maternal Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrapartum complications</td>
<td>Spinal anesthesia, supplemental oxygen, left lateral position</td>
</tr>
<tr>
<td>Difficult perineal delivery</td>
<td>Vaginal birth, epidural anesthesia, cesarean section</td>
</tr>
<tr>
<td>Intrauterine growth</td>
<td>Antepartum amniosentesis, cesarean section</td>
</tr>
<tr>
<td>Increased risk of cesarean section</td>
<td>Amnioncensis, forceps, vacuum extraction</td>
</tr>
<tr>
<td>Maternal and fetal distress</td>
<td>General anesthesia, epidural anesthesia, cesarean section</td>
</tr>
<tr>
<td>Neonatal complications</td>
<td>Antepartum anesthetic, cesarean section</td>
</tr>
<tr>
<td>Maternal and fetal distress</td>
<td>General anesthesia, epidural anesthesia, cesarean section</td>
</tr>
<tr>
<td>Enhanced risk of hemorrhage</td>
<td>Invasive cardiac monitor, fetal heart rate monitoring</td>
</tr>
<tr>
<td>Enhanced risk of infection</td>
<td>Crean section for cord prolapse, sepsis, puerperal sepsis, and skin incision</td>
</tr>
<tr>
<td>Enhanced risk of infection</td>
<td>Invasive cardiac monitor, fetal heart rate monitoring</td>
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The Case

• 38 yo G4P2012 at 34 1/7 weeks by a 19 week US
• Presented to the outside hospital with complaints of 4 days of shortness of breath and worsening lower extremity edema
• Transferred to tertiary care center due to:
  ◦ Respiratory Distress
  ◦ Pre-eclampsia with severe features

The Case

• Medical History
  ◦ Chronic Hypertension
  ◦ Diagnosed in 1997
  ◦ Type 2 DM (Insulin dependent)
  ◦ Diagnosed in 2011
  ◦ Advanced Maternal Age
  ◦ Morbid Obesity, Class III
    ◦ BMI 66
• Surgical History
  ◦ Suction D&C for a missed AB
The Case

- Obstetric History
  - 1996 Early SAB with D&C
  - 1997 TSVD of 2948g viable male infant
  - 1999 TSVD of 2977g viable male infant

- Family History
  - Mom - deceased at age 39 due to heart disease
  - Extensive history of DM, Htn, CAD

- Social History
  - Neg for tobacco, alcohol, drug use
  - Lives with her 2 sons

- Meds
  - Levemir 40 units QHS
  - Labetalol 600 mg PO BID
  - Aspirin 80 mg daily

- Allergies - NKDA

The Details

- Physical Exam
  - Vitals
    - BP 212/118  HR 90  R 32  T 96.8  95% on 2L NC
    - Height 5’7  Weight 432 lbs
  - Gen - unable to take deep breaths, pulling at her nasal cannula
  - Lungs - coarse crackles throughout & end expiratory wheezes
  - CV - RRR; +3 lower extremity edema bilaterally
  - Abdomen - morbidly obese, soft, nontender
  - Cervical Exam - 1/50/-3
  - Bedside US: FHT at 169 bpm, cephalic
The Details

- **Lab Results**
  - Hgb 9.4, WBC 8.3, Plt 518
  - PT 12.4, INR 1.13
  - Na 132, K 3.7, Cl 102, CO2 22, Cr 0.6
  - AST, ALT normal
  - P:C too high to calculate
  - Troponin <0.012, D-Dimer 518

The Details

- **Imaging**
  - CXR: Cardiomegaly & diffuse airspace opacities suggestive of pulmonary edema
  - Echo: normal EF, mild to moderate elevation in right heart pressures, no pericardial effusion

Upon Transfer

- **Patient was taken to the Medical ICU**
- **Pre-eclampsia with Severe Features**
  - BP controlled with IV Labetalol drip
  - Magnesium not given due to pulm status
- **Pulmonary Edema**
  - Aggressive diuresis initiated with Lasix
  - O2 support given
- **Overall Plan**
  - Delivery via Cesarean section in the AM
Change of Plans

- Patient evaluated by MFM service in the AM
- Decision made to proceed with IOL
  - Penicillin started for GBS prophylaxis

<table>
<thead>
<tr>
<th>Time</th>
<th>SVE</th>
<th>FHT</th>
<th>Category</th>
<th>Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>0945</td>
<td>1/50/3</td>
<td>Category I</td>
<td>AROM, FSE, IUPEC placement, Pitocin</td>
<td></td>
</tr>
<tr>
<td>1204</td>
<td>2/70/3</td>
<td>Category II</td>
<td>Discontinue Pitocin. Intrauterine resuscitation due to a prolonged decel.</td>
<td></td>
</tr>
<tr>
<td>1602</td>
<td>3/70/3</td>
<td>Category II</td>
<td>Discontinue Pitocin. Intrauterine resuscitation due to recurrent late decels.</td>
<td></td>
</tr>
<tr>
<td>1734</td>
<td>3/90/3</td>
<td>Category II</td>
<td>Discontinue Pitocin. Deep variable decels; amnioinfusion started.</td>
<td></td>
</tr>
<tr>
<td>1919</td>
<td>4/90/2</td>
<td>Category II</td>
<td>Continue with IOL; FHT overall reassuring.</td>
<td></td>
</tr>
<tr>
<td>2231</td>
<td>7/90/2</td>
<td>Category II</td>
<td>Prolonged decel to 60 bpm x 5 minutes, unresponsive to resuscitation. Patient taken to the OR for a stat cesarean section.</td>
<td></td>
</tr>
</tbody>
</table>

The Delivery

- Underwent Primary Low Transverse Cesarean section under general anesthesia
- Pfannenstiel incision performed
- Uncomplicated; wound vac placed at the time of closure
- Neonatal stats:
  - Apgars 1, 4, 7
  - ApH 7.16, Base Excess -2.9
  - VpH 7.21, Base Excess -3.4
Post-Op

- Unable to be extubated immediately
- Returned to the Medical ICU
- Extubated the following day
  - Slowly weaned from oxygen
  - BP's controlled on PO Labetalol
  - Discharged from the ICU
- DVT prophylaxis started
  - Lovenox 60 BID

References


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