Surgical & Obstetric Issues with the Severely Obese Patient

Sharon Phelan MD

Women's Health Conference

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Objectives

Learner will be able to:

1. List the associated medical issues that complicate caring for the obese pregnant patient
2. Describe the anesthesia issue for the severely obese patient
3. Explain the interventions that be may necessary for the care of a severely obese patient in an OR or LDR

Disclosure of potential conflict

I own shares of ……

Disclosure of potential conflict

I own shares of ……

Krispy Kreme

Major Public Health Issue in US

- 25% or 34 million Americans are overweight
- Increase from 1 in 8 (1991) adults to 1 in 3 (2008) who are obese
- 1/3 pregnant women are obese,
- Racial distribution:
  - 45% of American Indian women
  - 45% African American women;
  - 35% Hispanic women,
  - 25% White women
- Women are generally at increased risk – up to 67% overweight or obese

Ogden JAMA 2006

Body Mass Index

• Healthy Weight	18.5*-24.9	(110-149)
• Over Weight	25-29.9	(150-179)
• Obesity		
– Class I	30 - 34.9	(180-209)
– Class II	35 - 39.9	(210-239)
– Class III	≥ 40	(240-329)
-- Super	≥ 55	(≥ 330)

(weight in pounds for 5’5” woman)

International Obesity Task Force

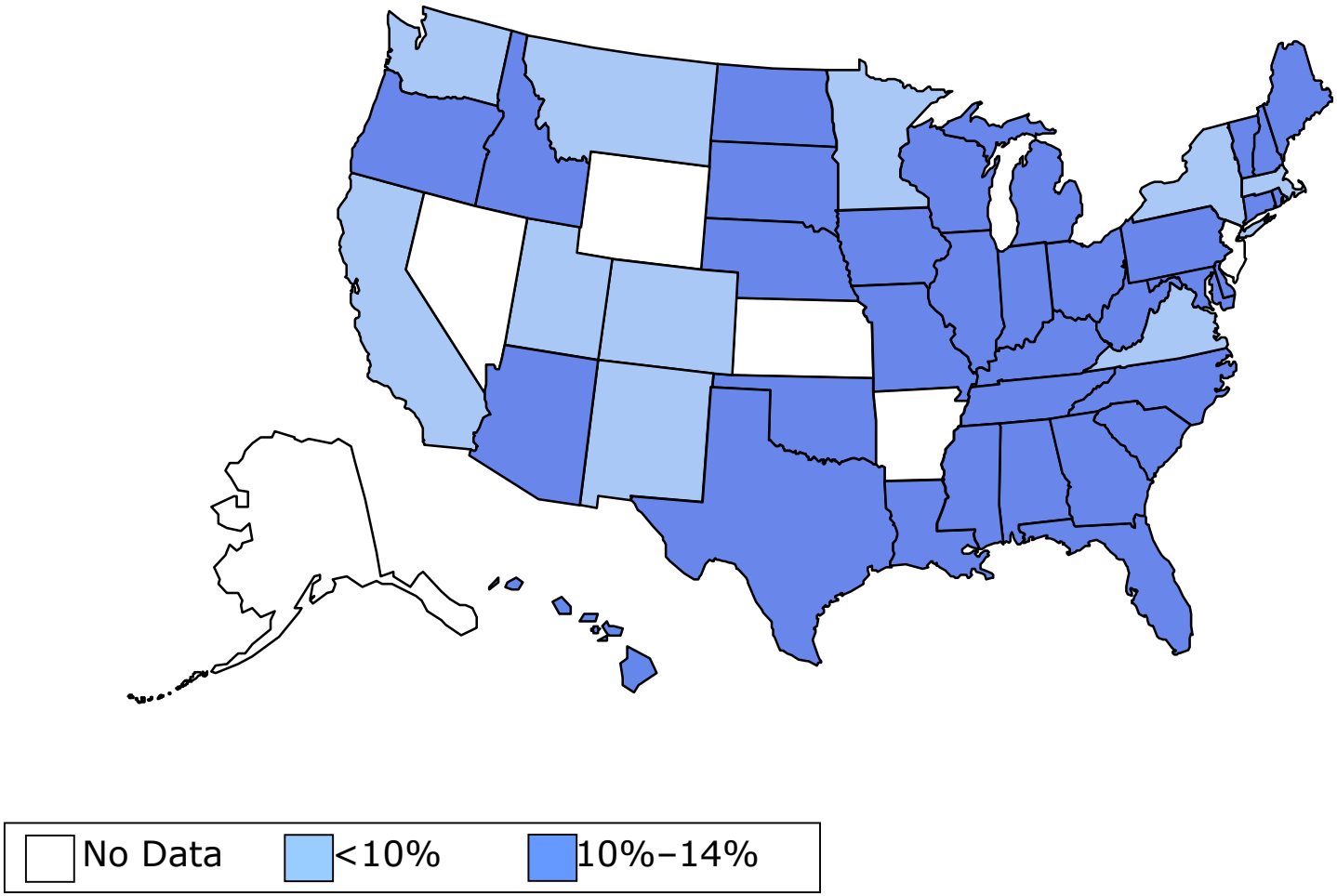
Obesity Trends Among U.S. Adults between 1985 and 2003

Source of the data:

- The data shown in these maps were collected through CDC's Behavioral Risk Factor Surveillance System (BRFSS). Each year, state health departments use standard procedures to collect data through a series of monthly telephone interviews with U.S. adults.
- Prevalence estimates generated for the maps may vary slightly from those generated for the states by BRFSS (http://aps.nccd.cdc.gov/brfss) as slightly different analytic methods are used.

Obesity Trends* Among U.S. Adults

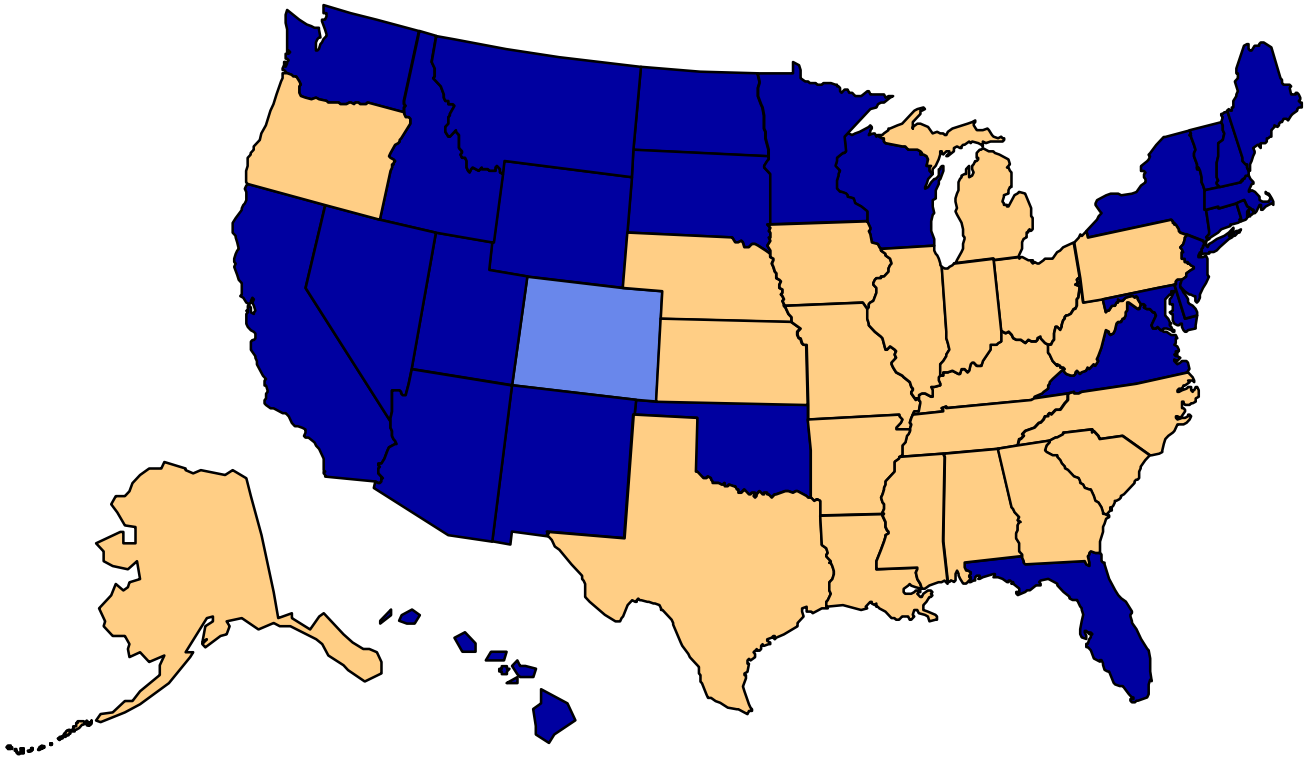
BRFSS, 1990



Obesity Trends* Among U.S. Adults

BRFSS, 2000

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

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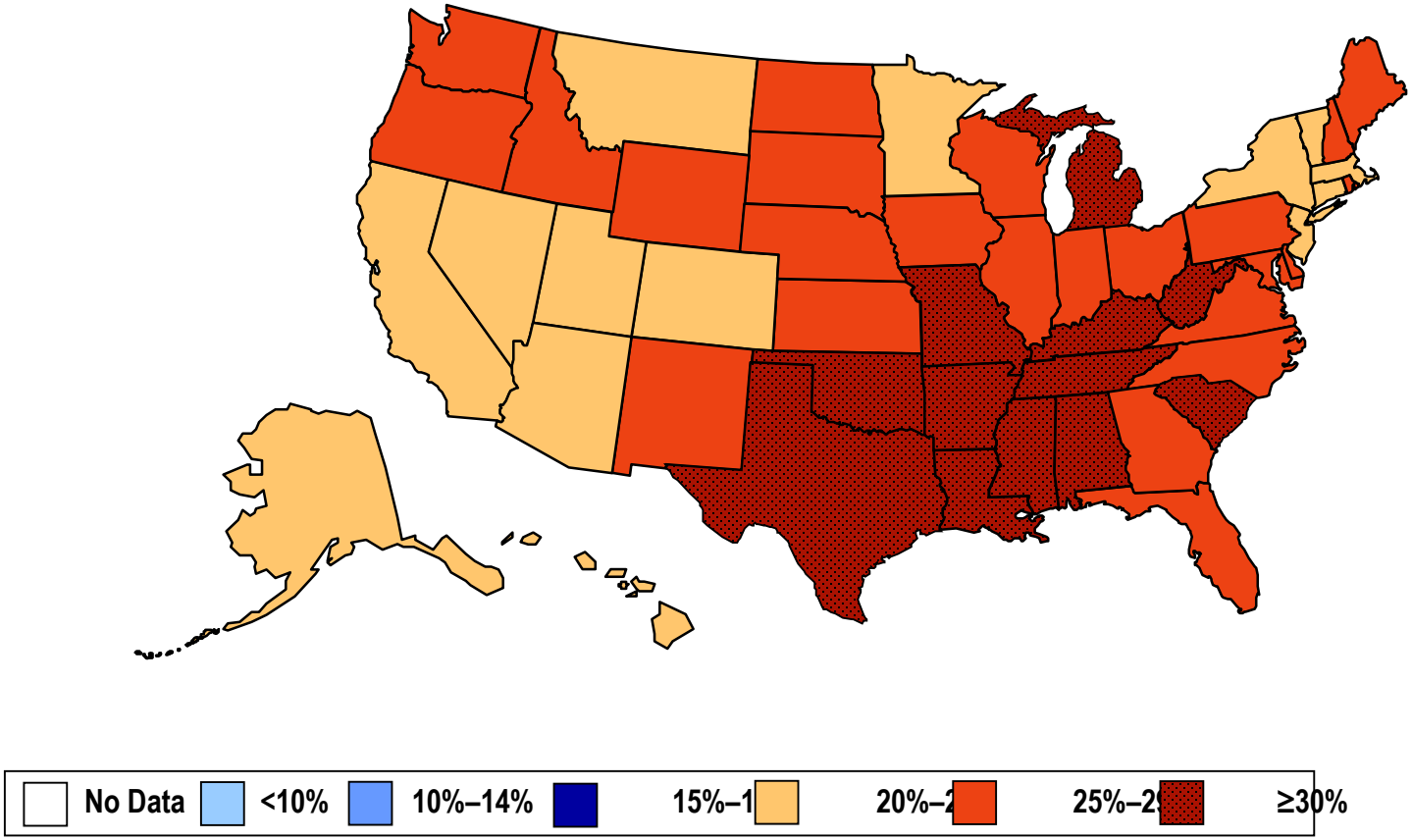


Source: Behavioral Risk Factor Surveillance System, CDC.

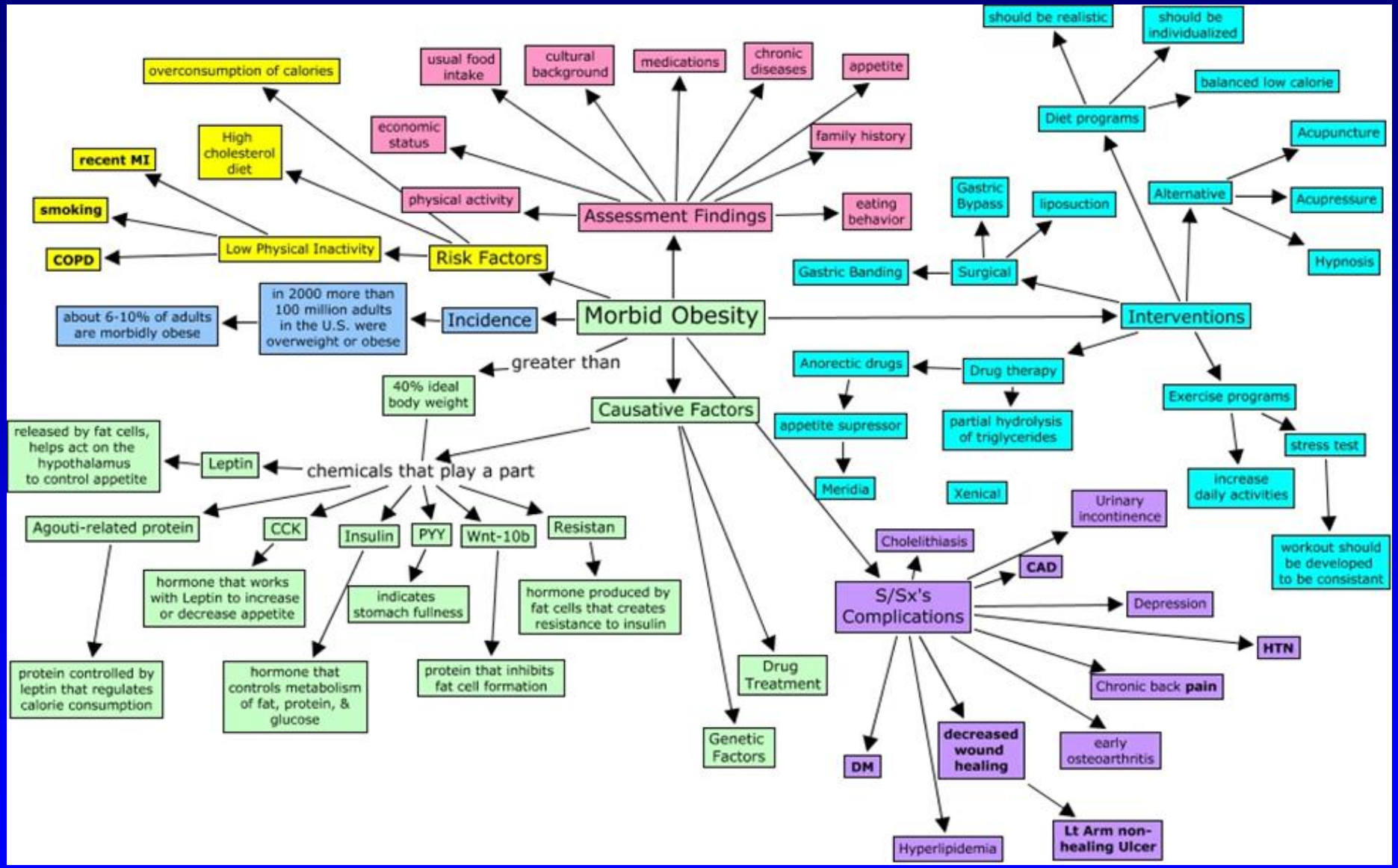
Obesity: Pathophysiology

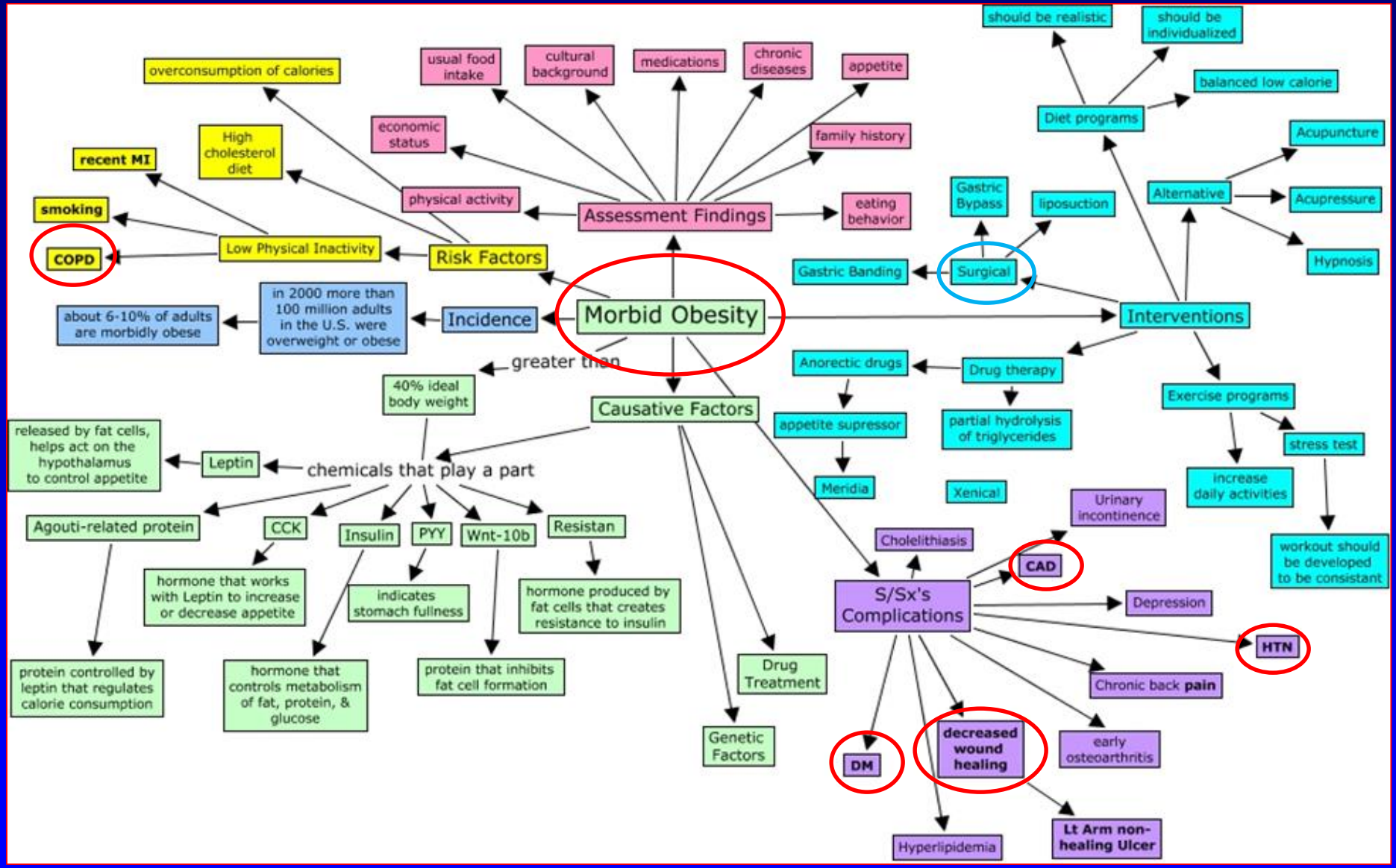
Patterns of obesity (correlation with mortality)

- Android (central, truncal) – increased O_2 consumption, CV disease
- Gynecoid (hip, thighs) – less metabolically active
- Intraabdominal – associated with CV risk, LV dysfunction

General Morbidity Of Obesity

- Diabetes
- Hypertension
- Gallstones and Kidney Stones
- Gastric Reflux
- Sleep apnea
- Increased surgical risks
- Depression
- Cancer


Morbid Obesity
Incidence
in 2000 more than 100 million adults in the U.S. were overweight or obese
about 6-10% of adults are morbidly obese
Risk Factors
Low Physical Inactivity
smoking
COPD
recent MI
High cholesterol diet
overconsumption of calories
physical activity
Assessment Findings
usual food intake
cultural background
medications
chronic diseases
appetite
family history
eating behavior
economic status
Causative Factors
greater than
40% ideal body weight
chemicals that play a part
Leptin
released by fat cells, helps act on the hypothalamus to control appetite
Agouti-related protein
protein controlled by leptin that regulates calorie consumption
CCK
hormone that works with Leptin to increase or decrease appetite
Insulin
hormone that controls metabolism of fat, protein, & glucose
PYY
indicates stomach fullness
Wnt-10b
protein that inhibits fat cell formation
Resistan
hormone produced by fat cells that creates resistance to insulin
Genetic Factors
Drug Treatment
Interventions
Diet programs
should be realistic
should be individualized
balanced low calorie
Alternative
Acupuncture
Acupressure
Hypnosis
Surgical
Gastric Bypass
liposuction
Gastric Banding
Drug therapy
Anorectic drugs
appetite supressor
Meridia
partial hydrolysis of triglycerides
Xenical
Exercise programs
increase daily activities
stress test
workout should be developed to be consistant
S/Sx's Complications
Cholelithiasis
Urinary incontinence
CAD
Depression
HTN
Chronic back pain
early osteoarthritis
decreased wound healing
Lt Arm non-healing Ulcer
Hyperlipidemia
DM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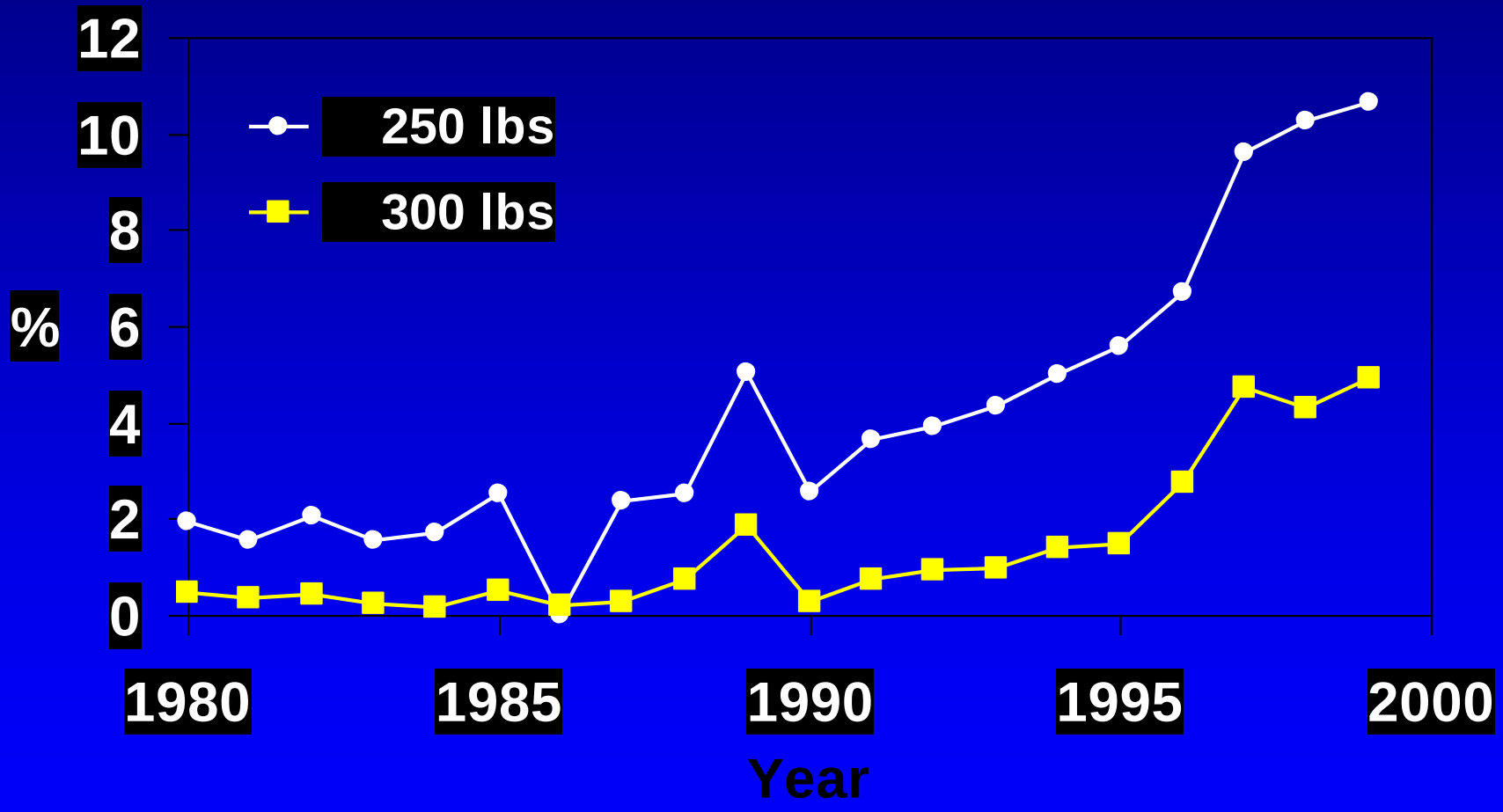
Trends of Maternal Obesity



Lu et al. – Am J Obstet Gynecol 2001

Obstetric Morbidity Of Obesity

- Increase prenatal risk of
  - PIH (20x higher)/Pre-eclampsia (10x higher)
  - Gestational Diabetes (6-20x higher)
  - Macrosomia (18x higher)
  - Twins (DC/DA)
  - Neural Tube Defects or other anomalies (37% higher)
  - Difficulty with u/s and antenatal testing
  - IUFD and neonatal deaths (2-3x higher)

Cnattingius NEJM 1998

How Does Ob Care Contribute to Obesity Crisis?

TABLE

The 2009 Institute of Medicine recommendations for total weight gain ranges for pregnant women

Body mass index category (kg/m^2)	Recommended total gestational weight gain	
	kg	lb
<18.5	12.5-18	28-40
18.5-24.9	11.5-16	25-35
25.0-29.9	7-11.5	15-25
>30.0	5-9	11-20

Adapted from the 2009 Institute of Medicine report.[28]

Phelan. Teachable moment: weight control and obesity prevention. Am J Obstet Gynecol 2009.

- Yet a normal fetus/placenta/AF only accounts for 10-15# of weight

Management in Pregnancy: Generally Prenatal Advice

- Counsel on ideal wt gain early – including telling patient if she is obese ***
- Not a time to “diet”
- Maximize intake of healthy foods
- A craving doesn’t mean the baby needs it.
- Monitor weight - give patient feedback – reduces excessive weight gain by 40%
- A fat baby is not a health baby

Prenatal Management in BMI>40: First Two Trimesters

- Early u/s to verify dating and r/o twins
- Early diabetes screen and at 24-26 wk
- Encourage MMS and anatomy screen for anomalies – (technically difficult)
- Serial Growth U/S (S≠D)
- Identify Co-morbidities and treat (Don't forget Obstructive Sleep Apnea)

Prenatal Management in BMI>40: Last Trimester

- Continue serial U/S for growth and position
- Monitor for and treat Co-morbidities
- Anesthesia consult
- Consider EKG
- Antenatal testing for obesity ?
- Schedule delivery
  - Timing : base on co-morbidities and obesity
  - Location : Is referral indicated?

Respiratory Changes in Pregnancy and Obesity

	Pregnancy	Obesity	Combined
Tidal volume	↑	↓	↑
Respiratory rate	↑	↑	↑
Minute volume	↑	→	↑
FRC	↓↓	↓↓↓	↓↓
Total lung capacity	↓	↓↓	↓
Work of breathing	↑	↑↑	↑
PaO_2	↑	↓↓	↓
$PaCO_2$	↓	→↑	↓

Cardiovascular Changes in Pregnancy and Obesity

	Pregnancy	Obesity	Combined
Blood volume	↑↑	↑	↑↑
Cardiac output	↑↑	↑↑	↑↑↑
Blood pressure	→	↑	↑
Systemic vascular resistance	↓	↑	→
Blood pressure	→	↑	↑
HR	↑	↑	↑
Supine hypotension	↑	↑	↑↑

Intrapartum Morbidity of BMI>40

- Often need for Induction of labor
- Difficulty in monitoring fetus/es
- C/S rate for FTP (3x) and failed TOLAC (2x)
  - Surgical risks: infection, injury, operative time
  - Anesthetic risks: especially for emergent surgery
- Macrosomia with resulting birth trauma(18x higher)
- Twins (DC/DA)
- PP Hemorrhage
- DVT risk
- Infectious complications

Management in Obese Pregnancy - Intrapartum

- If BMI > 40 anesthesia consult –on L&D
- If TOLAC – note success rates ↓ by 50%
- If concerning labor pattern–you can not do a "crash" section in setting of morbid or super morbid obesity.
- Consider Type &Cross due to risk of PPH
- Surgical issues of instruments, incision, etc
- Risk of DVT – initiate SCD early in labor
- Be ready for macrosomic dystocia

Management in Obese Pregnancy - Intrapartum

- Treat Co-morbidities
- Continue DVT prevention
- 2 IV's (LONG 16 or 18 gauge)
- Monitor opioid use for labor pains
- Consider early regional anesthesia
- Determine delivery location (equipment)
- Be prepared for shoulder dystocia – step stools in room

Anesthetic Management for Labor

- Obese parturients need good analgesia
  - Effective pain relief improves respiratory function, decreases O_2 consumption
  - Effective pain relief attenuates cardiovascular response to contraction pain (HR, BP, CO)
  - Higher incidence of macrosomia, complicated labor, painful contractions
- Higher incidence of induction, risk of failure with C/S
- **Need a flexible plan for labor analgesia for vaginal delivery/labor analgesia ending in Cesarean section**
  - Continuous technique can be extended for cesarean delivery
  - GA can be avoided in urgent C-section

Anesthetic Implications of Morbid Obesity

- Comorbidities that all increase anesthetic risk (ASA III)
- Difficult access, line placement
- Difficulty moving and positioning the patient
- Difficulty monitoring (BP cuff)
- Potentially difficult airway management and increase risk of aspiration

ACOG recommendation:

"Because these patients are at increased risk for emergent cesarean delivery and anesthetic complications, anesthesiology consultation before delivery is encouraged"

Why worry?

- Most anesthesia complications are AIRWAY complications in obese women with inability to ventilate/intubate or aspiration
- Both obesity and pregnancy increase the risk for difficult intubation. **Incidence of failed intubation**
  - **1:300 in obstetric patients,**
  - **1:2200 in general surgical population,**
  - **1:3 (1:7) in morbidly obese pregnant patients**
- Most morbidly obese will require an anesthetic intervention
  - >50% will have cesarean delivery
- General carries unacceptable risk in these patients
- Early anesthesia consult: planning to decreases the risk

Operative Risks in the Settings of Extreme Obesity

Traveling to DR/OR

- Do not starting dosing epidural during or before transit.
- Need patient mobile to move to table.
- Be careful of lines- easy to displace
- Be sure stretcher is weight compatible
- Careful of supine hypotension
- Antibiotics 3gm vs 2 gm x2
  - Do repeat if surgery >2 hours

Positioning for Intubation

- Standard positioning of a non-obese patient
  - Dashed line (ear to sternal notch) should be horizontal
- Ramped position
  - Stack of blankets or wedge elevate the shoulders and neck
  - Arms have to be supported to prevent hyperextension and brachial plexus injury
- Same can be achieved by repositioning the operating table

Positioning for Cesarean Section
(Any Type of Anesthetic)

- Optimize intubating position (even if not GA)
  - Ramp, head-elevated position, reverse Trendelenburg
- Left uterine displacement should be maintained
  - Prevent IVC compression: ↓venous return, cardiac output
  - Aortic compression – aorta more compressible when patient hypotensive – cardiovascular collapse
- Supine hypotensive syndrome
  - From mild symptoms to cardiovascular collapse
  - Can be life threatening to both mother and fetus
- Obese supine hypotension syndrome
  - Case reports of sudden death when supine

General Anesthesia for Cesarean Delivery

- What if GA cannot be avoided in the morbidly obese parturient?
- If it is an emergency and:
  - The patient does not have an epidural catheter
  - If there is no time for spinal anesthesia
- If there is a contraindication to any neuraxial technique
- Concern about airway management
  - Aspiration prophylaxis
  - Optimal positioning
  - Good preoxygenation is extremely important
  - Skilled help
- Combination of morbid obesity and pregnancy greatly increases the risk of GA

Intubating the Morbidly Obese Patient

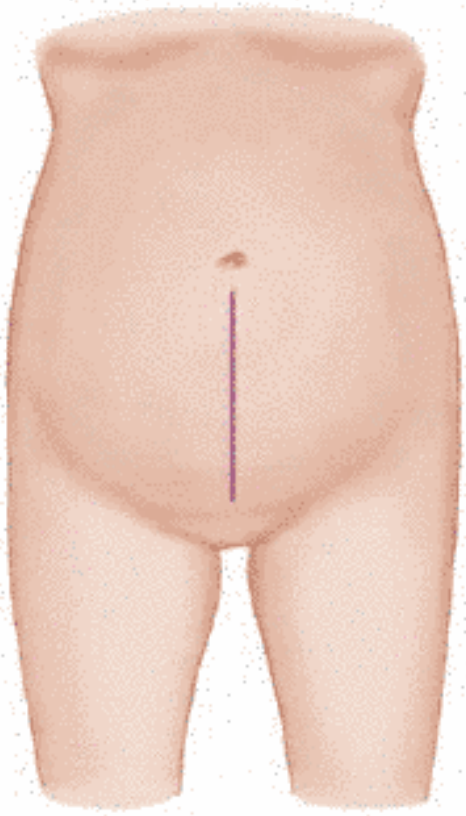
- Supine position (awake) causes:
  - Ventilatory impairment
  - Inferior vena cava (and aortic) compression
  - Decrease in tidal volume
- Head-elevation pillow/wedge/ramp made of blankets
- Proper laryngoscope position
- Adequate preoxygenation is VITAL!
  - Morbidly obese are prone to very quick desaturation
  - Goal: to achieve the longest possible safe apnea period
- Aspiration prophylaxis
- Specialized airway equipment if difficult intubation anticipated
  - Role of awake intubation
  - Minimal sedation
- Consider referral if can not meet these criteria

Taking Care of Two Patients: Maternal and Fetal Safety Considerations during GA

- The mother's life should never be jeopardized
  - Never proceed without preoxygenation
- Maternal oxygenation
  - Maternal hypoxemia causes fetal hypoxia
- Maternal acid-base status
  - Maternal hypercapnia (respiratory acidosis) $\rightarrow$ fetal acidosis
  - Maternal alkalosis $\rightarrow$ umbilical artery constriction
- Uteroplacental perfusion
  - Depends on maternal BP – no autoregulation
  - Causes of hypotension: deep GA; hemorrhage, hypovolemia; aortocaval compression

Abdominal Incision

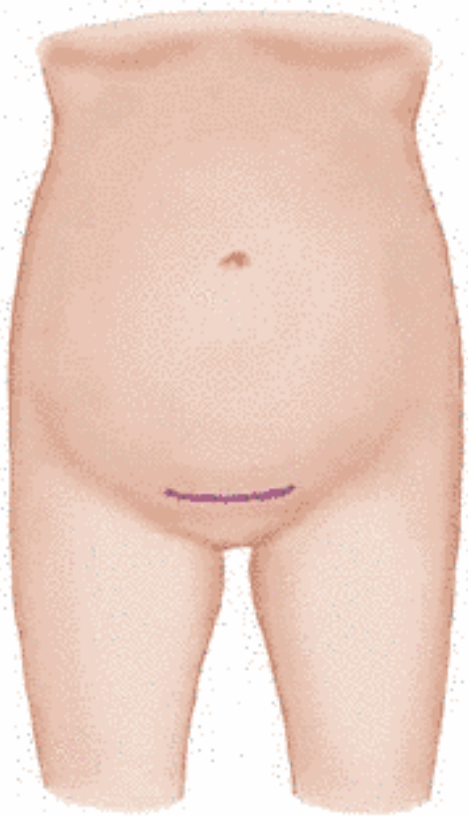
Vertical



Advantages
- Quicker to perform
- Better visualization of the uterus
- Can quickly extend upward for greater visualization if needed
- Often more appropriate for obese women

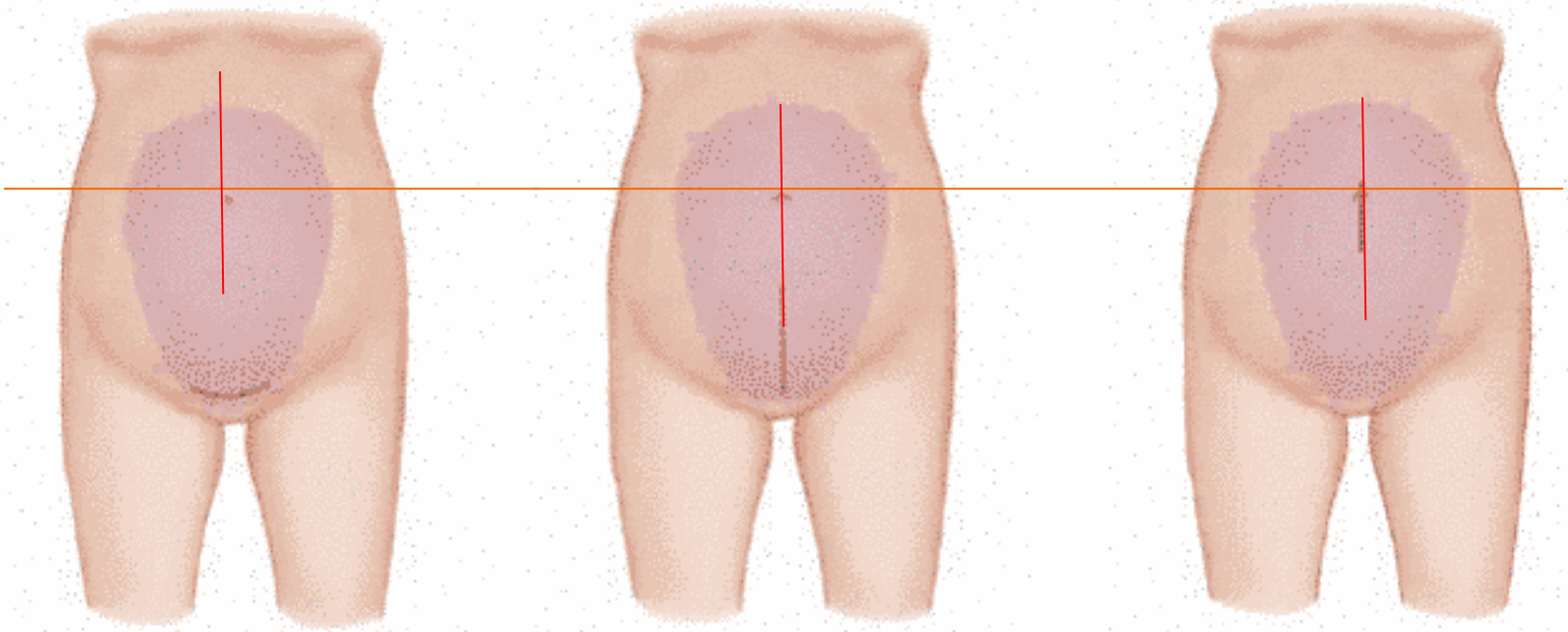
Disadvantages
- Easily visible when healed
- Greater chance of dehiscence and hernia formation

Pfannenstiel



Advantages
- Less visibility when healed and the pubic hair grows back
- Less chance of dehiscence or formation of a hernia

Disadvantages
- Less visualization of the uterus
- Cannot be done as quickly, which may be important in an emergency cesarean birth
- Cannot easily be extended to give greater operative exposure
- Re-entry at a subsequent cesarean birth may require more time



Advantages
Unlikely to rupture during a subsequent birth
Makes VBAC possible for subsequent pregnancy
Less blood loss
Easier to repair
Less adhesion formation

Disadvantage
Limited ability to extend laterally to enlarge the incision

Advantage
Can be extended upward to make a larger incision if needed

Disadvantages
Slightly more likely to rupture during a subsequent birth
A tear may extend the incision downward into the cervix

Advantage
May be the only choice in these situations:

Implantation of a placenta previa on the lower anterior uterine wall
Presence of dense adhesions from previous surgery
Transverse lie of a large fetus with the shoulder impacted in the mother's pelvis

Disadvantages
Most likely of the uterine incisions to rupture during a subsequent birth
Eliminates VBAC as an option for birth of a subsequent infant

Left uterine displacement
(BMI 48.5, not even super morbidly obese)

Case

- 33-y-o G1 P0, EGA 39 weeks, 129kg, 163 cm (5’4”), **BMI 48.5**, for induction of labor for type II diabetes with poor blood sugar control on insulin and metformin, macrosomia, and polyhydramnios. Admitted on Saturday evening; misoprostol started
- Sunday morning: anesthesia team aware of morbidly obese parturient. Anesthesia evaluation shows airway exam: Mallampati I, neck full range of motion, front teeth intact. Patient will think about epidural
- Pt. requested epidural the following morning (Monday morning 10 AM) Epidural placement uncomplicated; loss of resistance at 9 cm, but single attempt
- Early Tuesday morning, IOL day #3) no change in the last 6 hours. Concern for chorioamnionitis, FHR 150s, late decelerations and decreased variability. Patient consented for cesarean delivery for FTP;

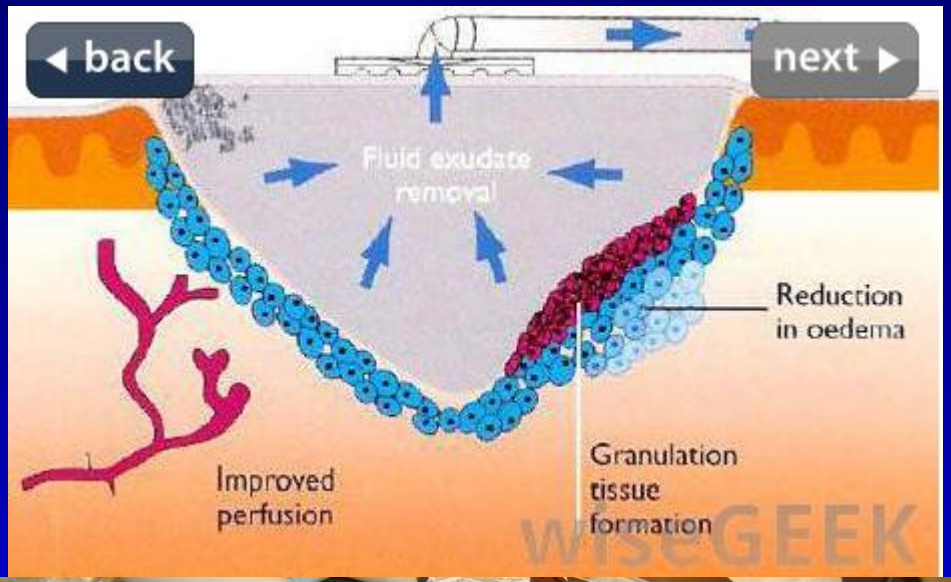
Case continued

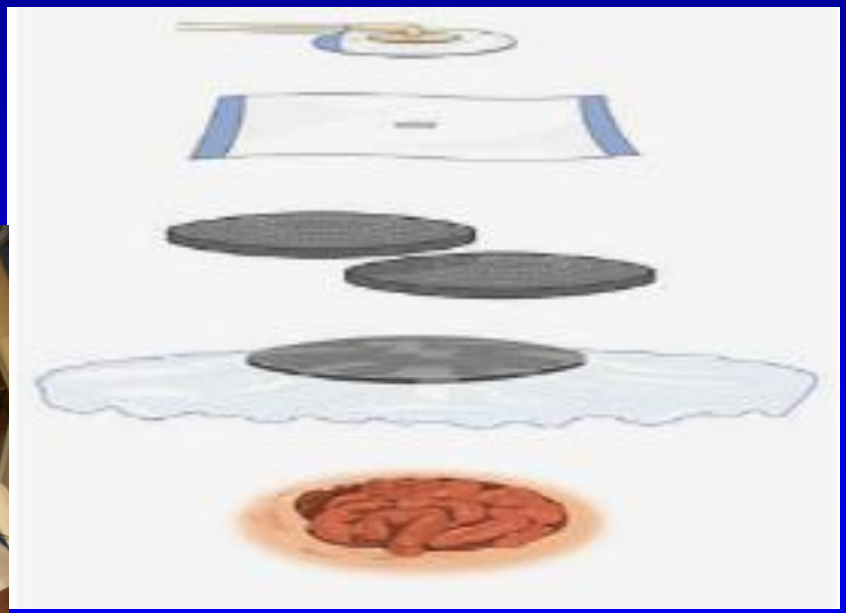
- Pt. taken to OR at 0858 on Tuesday morning
- Ramp (for positioning) had been built by anesthesia team
- Pt. moved herself (with some help) to OR table (7 minutes)
- Left uterine displacement (minimal left tilt)
- IV, epidural catheter intact
- Monitors attached (standard ASA monitors + FSE)
- FHR 174-180
- O_2 nasal cannula
- Lidocaine 2% injected to establish surgical anesthesia (5 ml increments every 2-3 minutes, total 30 ml)
- 0920 (22 minutes later) sensory level adequate
- Pannus elevated and secure (20 minutes)

Case continued

- FSE removed after full prep&drape at 0939
- Incision at 0940
- Uterine incision 0951
- Delivery at 0953 **(about 1 hour after we started moving the patient from her room to the operating room)**
- Apgars 9, 9, 4155g.
- Total operating time 1 hour 11 minutes, EBL 600 ml

Wound Vac


back
next
Fluid exudate removal
Reduction in oedema
Improved perfusion
Granulation tissue formation
wiseGEEK



Postpartum Pulmonary Dysfunction

- Prolonged duration of GA anesthetics, fat deposition
- Pharmacologic factors
  - Residual anesthetics blunt the ventilatory response – the morbidly obese are hypoxemic at baseline
  - Opioids cause respiratory depression, hypoventilation, atelectasis, pneumonia – especially patients with OSA
  - Residual paralysis compromises airway patency, ability to clear secretion, protect the airway; weakens respiratory muscles
- Mechanical
  - Obesity decreases pulmonary compliance
  - Airway obstruction increases airway & work of breathing
- Pain interferes with breathing after abdominal surgery

Prevention of Postpartum Pulmonary Complications

- Oxygenation needs to be monitored
- Choice of postoperative analgesia
  - Avoidance of IV opioids – less respiratory depression, especially in OSA
- Incentive spirometry: Use properly
- Other: optimal preoperative treatment of any underlying lung disease; smoking cessation
- Good sugar control

Prevention of Postpartum Pulmonary Complications

- **Early mobilization** most important – may be impossible
- Place SCD's immediately postop
- 12 hours post-op start anticoagulation
  - Heparin: 5000 units q8 hours
  - Enoxaprin
    - 40 mg Q12 hours or
    - 0.5 mg/kg Q12 hours
  - When to stop??

Obstetric Morbidity Of Obesity

- Increase long term risk of
  - Maternal
    - Difficulty breastfeeding due to large breast and let down
    - Increasing Obesity
    - Chronic HTN
    - Complications with BCM: application or effectiveness
  - Fetal
    - Childhood obesity
    - Metabolic syndrome or cardiovascular concerns
    - Residual from birth trauma

Management: Postpartum and Inter-conceptive

- Life style changes as permanent modification : exercise, substance use, weight loss
- Portion size limits and nutritional balance
- Selection of foods: Cost, availability and storage
- Critical nature of community/family support
- Need to lose pregnancy related weight prior to next pregnancy (or more). Breastfeeding helps
- Eating healthy teaches children to eat healthy and like healthy foods

Summary: How to Avoid a Catastrophe

- Communication – multidiscipline approach
- Identify morbidly obese patients in prenatal clinic
- Refer them to anesthesia preop and on L&D
- Aggressive approach: early epidural placement
- High incidence of epidural failure: has to be replaced
- Prepare for a C-section -T&C, 2 IV's, airway equipment
- Technical and equipment issues
- Pay special attention to IV, epidural catheter
- Anticipate problems to avoid a CRASH section
- Anticipate longer time from LDR to OR table
- Careful postpartum care, especially if c-section

Comments from Audience