Size Matters: Perioperative Management of the Morbidly Obese

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Periop Mx of Morbidly Obese Pt

- Prevalence
- Preop evaluation and preparation
  - Metabolic syndrome
  - OSA, OHV
- Intraop Mx
  - Difficult intubation
  - Position
  - Ventilation strategy
- Postop Mx

Long term mortality after gastric bypass surgery

- Retrospective cohort
- 7929 surgical pts vs. 7929 severely obese control
- Long term mortality from any cause (DM, CAD, cancer etc) decreased by 40%

Adam TD et al, NEJM 2007;357:753-61

Obesity surgery mortality risk score: To predict risk in pts for gastric bypass

- 5 factors
  - BMI > 50
  - Male
  - Hypertension
  - Risk of thromboembolism
  - 45 yrs or older

DeMaria EJ et al, Surg Obese Relat Dis 2007;3:134-140
DeMaria EJ et al, Ann Surg 2007;246:578-584

Respiratory CX in Ambulatory Surgery (Prospective study)

- 17,368 outpts
- 15% morbidly obese
- 4-fold increase
  - intraop & postop respiratory events
  - Desaturation
  - Bronchospasm

F Chung et al, Br J Anaesth 1999; 83:262-270

Obesity as a Risk Factor for Unanticipated Admission after Ambulatory Surgery

- 235 obese pt (BMI>40) vs. control
  - Intraop bronchospasm
  - PONV
  - Postop O₂ requirement
- Not a risk factor for unplanned admission
  - 26% vs. 22.1% Odds ratio 1.3


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Preoperative Assessment and Preparation

- Recognize metabolic syndrome
- Recognize OSA, Recognize OHV

Preop Measurement

- BMI; IBW
- Waist and hip circumference; WHR
- Abdominal wall thickness; intra-abdominal fat
- Neck circumference; difficult intubation 43 cm
- STOP-Bang questionnaire

Preoperative Evaluation

- STOP-Bang questionnaire
- Oxygen saturation
- Glucose intolerance
- Liver function

Neck circumference & probability of problematic intubation

Preop wt loss with a low energy diet reduces size of liver dramatically

- 8% reduction of wt: 80% reduction of liver volume 0-2 wks
- Min. duration for a preop diet: 2 wk
- 6 wk: maximal liver vol. reduction
- Easier approach for surgery

Colles SL Am J Clin Nutr 2006;84:304-11

Preop 10% wt loss a shorter LOS, and few postop Cx after gastric bypass surgery

Benotti PN et al Arch Surg 2009;144:1150-54

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Prevalence of OSA in Morbidly Obese Pt for Bariatric Surgery

- 71% dx to have OSA by sleep studies

WC Frey, Obese Surg 2003; 13:676-83

STOP questionnaire to screen OSA

- S - Snoring
- T - Tiredness / sleepiness / fatigue
- O - Obstruction of breathing
- P - Blood Pressure (>140/90) treated or untreated

Chung et al. Anesthesiology 2008; 108:1-10

STOP- Bang

- STOP
- B BMI>35
- A Age >50
- N Neck circumference >40 cm
- G Gender male

Higher sensitivity and specificity
- 3 / 8 questionnaire positive

Chung et al. Anesthesiology 2008; 108:1-10
ODI > 10 sensitive and specific for moderate and severe OSA

Mean overnight PaO2 <94.6% has higher postop adverse events

MO pts after surgical wt loss still has significant OSA: a meta-analysis

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  - Anesthetic strategy
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Periop Mx of Morbidly Obese Pt

Morbid obesity and difficult airway Mx – What is the risk?

- Obese pts
- 37% of all adverse events at induction
- 58% at extubation

MO accounts for high incidence of difficult airway: ASA closed claims study

- Obese pts
- Predictors of difficult mask ventilation
  - Increased BMI
  - OSA or history of snoring
  - Beard
  - Older age

Peterson GN Anesthesiology 2005;103:33-9

Kheterpal S et al Anesthesiology 2006;105:885-91

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**Difficult tracheal intubation: controversial**

- 13-20% of all intubation in MO
- High Mallampati score $\geq 3$
- Increased neck circumference $> 43$ cm
- Excessive pre-tracheal fat

Ezri T et al  CJA 2003;50:179-83
Gonzalez H et al  A&A 2008;106:1132-6

**Mouth opening and morbid obesity**

- Full mouth opening obtained with 26 degree of craniocervical extension from neutral
- Pts with restricted craniocervical movement
- Reduced mouth opening ability

Calder I et al  Anesthesiology 2003;99:799-801

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**Pulmonary atelectasis between morbidly obese and non-obese pts**

AS Eichenberger et al, Anesth Analg 2002; 95:1788-95

**Preoxygenation is effective in 25° head-up vs. supine position**

- Severely obese pts, 3 min preoxygenation, 25° head-up vs. supine
- $\text{PaO}_2$ increased by 82 mm Hg
- Apnea time to desaturate to 92% increased by 1 min


**Low FiO2 prevent atelectasis at induction**

- 100% O2: 6.8% atelectasis
- 80% O2: 0.8% atelectasis
- Decrease critical time available for intubation
- Cannot be recommended

Akca O et al Anesthesiology 1999;91:991-8
Edmark I et al Anesthesiology 2003;98:28-33
NPPV and RM improve PaO2 after intubation of MO pts
- Preoxygenation + NPPV + RM
- NPPV (Pr support 8ml/kg + PEEP 8cm)
- RM: 40cm H2O for 40s
- Improves PaO2
- Improves end-expiratory lung volume

Futier E et al Anesthesiology 2011;114:1354-63

Increase in PaO2 with PEEP in obese pts but not in normal subjects

P Pelosi et al, Anesthesiology 1999; 91:1221-31

Recruitment maneuvers open up collapsed area by plateau pr.
- CPAP maneuvers
  40 cm H2O for 10-30 s
  PEEP after CPAP maneuvers keep lung open
- “Cycling” maneuvers

FX Whalen et al, Anesth Analg 2006; 102:298-305

Pr. controlled ventilation is better than volume controlled ventilation
- Pr. controlled ventilation vs. volume controlled ventilations
- Improve oxygenation without side effects
- Lower tidal volumes
- PEEP

Soni N et al Br J Anaesth 101: 446-57
Cadi P et al Br J Anaesth 2008;100:709-16

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  Anesthetic strategy
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Obese Patients

- Goals for Obese pts:
  - Rapid awakening & assessment
  - Recovery of mobility & function
  - Rapid recovery of airway patency, effective ventilation and protective airway responses

Summary of Drugs and Pharmacokinetic Considerations

<table>
<thead>
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<th>Base dose on</th>
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<td>Propofol</td>
<td>TBW</td>
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</tr>
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Lean BW: a more appropriate wt-based scalar for propofol infusion for induction of GA in MO pts


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Succinylcholine Dose

- Increased conc. of pseudocholinesterase
- Increased volume of ECF
- Increased Sux requirements
- Based on TBW
- Better intubating condition


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**Rocuronium**

- Rocuronium dose in MO: IBW
- When dosed on TBW, duration of action: 2X


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**Fentanyl for MO pts: Use LBW**

- High CO in MO pts results in lower fentanyl conc.
- Dose of fentanyl: based on LBW
- Dose based on TBW may cause overdosing in MO

Shibutani K et al BJA 2005;95:377-83

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**Opioid requirements after lap. bariatric surgery**

- 42% severe pain
- More opioids in first 48h postop
- Predictors of severe pain
  - Younger pt
  - Male
  - Previous psychiatric hospitalization

Weingarten TN et al Obes Surg 2011;21:1407-12

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Opioid requirement in pediatric pts with OSA
- Opioid req’d of children with preop hypoxia (OSA) lower than those without preop hypoxia
- Suggesting increased sensitivity to opioid
- Lower opioid doses for OSA pts


Dexmedetomide Infusion during Laparoscopic Bariatric Surgery
- Dose ranging study 0.2, 0.4, 0.8 μg/kg/hr
- Dex infusion rate 0.2 μg/kg/hr
- Recommended to minimize risk of CVS side effects

B Tufanogullari, Anesth Analg 2008; 106:1743-8

Dexmedetomide Infusion during Laparoscopic Bariatric Surgery
- Reduce average end-tidal desflurane by 19%
- PACU stay shorter 20 min
- Reduce PACU fentanyl 36%
- Reduce nausea
- Fail to facilitate late recovery

B Tufanogullari, Anesth Analg 2008; 106:1743-8

Sugammadex 2mg/kg vs. neostigmine 0.05mg/kg in MO pts
- Mean time to 90% on TOF  3.5X faster
- TOF at PACU > 90% in Sugammadex gp
- Sugammadex prevents postop residual curarization better in MO pts

Gaszynski T et al BJA 2012;108:236-9

Impact of morbid obesity on epidural Cx in labor
- 125 MO pts vs. 125 control
- Systolic hypotension  16% vs. 4% p=0.003
- Diastolic hypotension  49% vs. 29% p=0.002
- Prolonged fetal ht decelerations
- 16% vs. 5% p=0.002

Vricella LK et al AJOG 2011;205:307.e1-6

Fast-track Surgery for Bariatric Laparoscopic Gastric Bypass
- Preoxygenation: 10 cm PEEP
- Induction: TCI
  - Propofol target 6 μg/ml
  - Remifentanil target 8 ng/ml
  - Fentanyl 100 μg
- Intubation: vecuronium

Fast-track Surgery for Bariatric Laparoscopic Gastric Bypass

**Maintenance**
- Desflurane 3-6% (0.5-1 MAC)
- Oxygen 40%
- Remifentanyl TCI

**End**
- Fentanyl 100 μg
- Reversal agents
- BIS
- PEEP 5 cm


Fast-track Surgery for Bariatric Laparoscopic Gastric Bypass

**Antiemetic Prophylaxis**
- Droperidol 1.25 mg
- Ondansetron 4 mg
- Dexamethasone 8 mg

**Postop Pain**
- Acetaminophen 1 gm IV
- Parecoxib 40 mg
- Bupivacaine infiltration


Fast-track Surgery for Bariatric Laparoscopic Gastric Bypass

**Perioperative Time**
- Arrival OR
- Induction
- Start surgery
- End surgery
- End anesthesia
- 7.4 min
- 11 min
- 3 min


Fast-track Surgery for Bariatric Laparoscopic Gastric Bypass

**PACU**
- 3-4 hr stay
- 20 m walk to toilet
- Discharge to ward
- 2-day stay


5 Principles in the anesthetic Mx of MO pt

- RA when possible
- Be prepared: Boy Scout’s motto
- GA: tracheal intubation and ventilation
- Postop care: monitoring, early mobilization
- Judicious use of any opioid by any route

Morbidly obese pt : 5 tips

- STOP-Bang questionnaire to screen OSA, OHV
- Use Troop pillow for intubation
- RM + PEEP to prevent atelectasis
- Use short acting agents
- Reverse trendelenburg position for extubation
To cure sometimes
To relieve often
To comfort always

Society of Anesthesia & Sleep Medicine
Annual meeting Oct 11-12
Washington Hilton
http://www.sasmhq.org

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