Size Matters: Perioperative Management of the Morbidly Obese

Frances Chung
Professor, Dept. of Anesthesiology
Toronto Western Hospital
University Health Network
University of Toronto

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 Relate Dies 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 O_2 requirement
- Not a risk factor for unplanned admission
  - 26% vs. 22.1% Odds ratio 1.3

RE Hofer et al, Mayo Clin Proc 2005; 83:908-13

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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

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- Neck circumference; difficult intubation 43 cm
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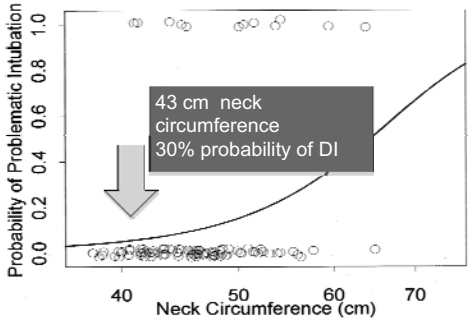
Neck circumference & probability of problematic intubation



Brodsky J B et al. Anesth Analg 2002;94:732-736

Preoperative Evaluation

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

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
Still CD et al Arch Surg 2007;142:994-98

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Prevalence of OSA in Morbidly Obese Pt for Bariatric Sugary

- 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

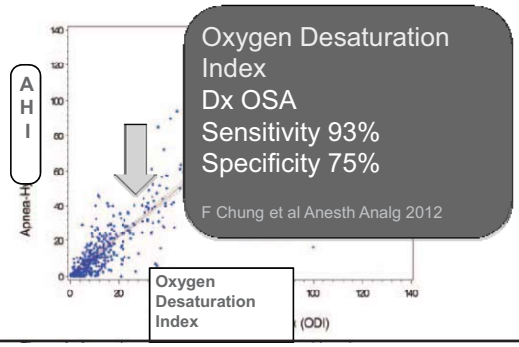
STOP- Bang

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

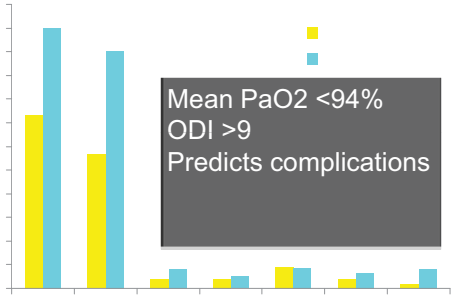
- **Higher sensitivity and specificity**
- **3 / 8 questionnaire positive**

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

- 12 studies (minimum 3m) : 342 pts
- BMI 55 to 38
- AHI 55 to 16
- Average AHI consistent with moderately severe OSA

Greenburg DL Am J Med 2009;122:535-42

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

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

Peterson GN Anesthesiology 2005;103:33-9

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

EMV 98% DMV 1.4% IMV 0.15%

Predictors of difficult mask ventilation

- Increased BMI
- OSA or history of snoring
- Beard
- Older age

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

Difficult tracheal intubation: controversial

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

Juvin P et al A&A 2003;97:595-600
Ezri T et al CJA 2003;50:179-83
Brodsky JB et al A&A 2002;94:732-6
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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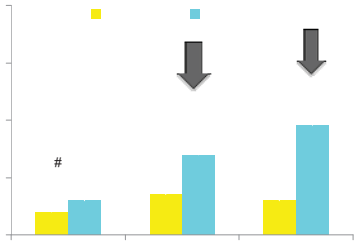
Pulmonary atelectasis between morbidly obese and non-obese pts



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
- PaO2 increased by 82 mm Hg
- Apnea time to desaturate to 92% increased by 1 min

Dixon BJ et al Anesthesiology 2005;102:1110-5

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

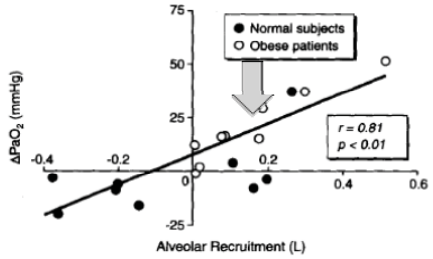
Akca O et al Anesthesiology 1999;91:991-8
Edmark I et al Anesthesiology 2003;98:28-33

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

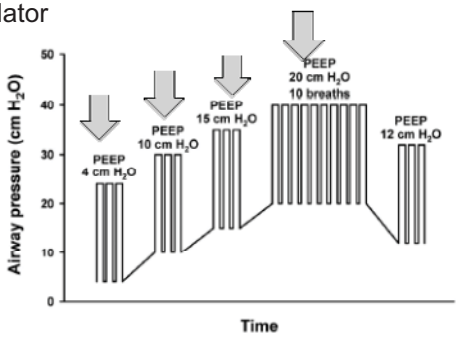


P Pelosi et al, Anesthesiology 1999; 91:1221-31

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

Performing the recruitment maneuver by a ventilator



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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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

Drug	Base dose on
Propofol	TBW
Succinylcholine	TBW
Rocuronium	IBW
Cis-atracurium	IBW
Vecuronium	IBW

Y Leykin et al, Best Prac Rese Clin Anaesth 2011; 25:27-36

Lean BW: a more appropriate wt-based scalar for propofol infusion for induction of GA in MO pts

Ingrande J et al A & A 2011;113:57-62

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Succinylcholine Dose

Increased conc. of pseudocholinesterase

- Increased volume of ECF
- Increased Sux requirements

- Based on TBW
- Better intubating condition

Lemmens HJ et al A & A 2006;102:438-42

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Y Leykin et al, Best Prac Rese Clin Anaesth 2011; 25:27-36

Rocuronium

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

Leykin Y et al A & A 2004;99:1086-9

Summary of Drugs and Pharmacokinetic Considerations

Drug	Base dose on
Fentanyl	LBW
Isoflurane	Expect prolonged recovery
Sevoflurane	Expect rapid recovery
Desflurane	Expect rapid recovery
Neostigmine	0.04-0.08 mg/kg
Sugammadex	No data available

Y Leykin et al, Best Prac Rese Clin Anaesth 2011; 25:27-36

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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Sugammadex	IBW may be inadequate

Y Leykin et al, Best Prac Rese Clin Anaesth 2011; 25:27-36
Llaurado et al Anesthesiology 2012; 117:1–1

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

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

Brown K A: Anesthesiology 2009;110:922-27

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

A Bergland et al, Acta Anaesth Scand 2008; 52:1394-9

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

A Bergland et al, Acta Anaesth Scand 2008; 52:1394-9

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

A Bergland et al, Acta Anaesth Scand 2008; 52:1394-9

Fast-track Surgery for Bariatric Laparoscopic Gastric Bypass

- Perioperative Time

Arrival OR → Induction	Induction → start surgery	End surgery → end anesthesia
7.4 min	11 min	3 min

A Bergland et al, Acta Anaesth Scand 2008; 52:1394-9

Fast-track Surgery for Bariatric Laparoscopic Gastric Bypass

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

A Bergland et al, Acta Anaesth Scand 2008; 52:1394-9

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 trendenlenburg position for extubation

To cure sometimes
To relieve often
To comfort always

Society of Anesthesia & Sleep Medicine

SASM

Annual meeting Oct 11-12
Washington Hilton
http://www.sasmhq.org