When do we need ICU after bariatric surgery?

at Sint Jan Brugge Hospital

Mulier J.P,
Dep Anesthesiology
AZ St Jan av Brugge Belgium

Jan.mulier@azbrugge.be
www.geocities.com/jan.mulier
Complications in SOS measured in 1164 surgery patients

Total mortality bariatric surgery: 0.5 to 2 %
Postoperative complications: 13 %

**pulmonary complications VAP only** 6.1 %
versus 1.5 % non bariatric surgery

other complications 4.8
leakage, abscess 2.1
wound complications 1.8
thrombosis, embolism 0.8
bleeding 0.5

Complications required reoperation in 2.2 % of the patients.

Reoperations and conversions over 10 years:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banding</td>
<td>31</td>
</tr>
<tr>
<td>VBG</td>
<td>21</td>
</tr>
<tr>
<td>Gastric bypass</td>
<td>17</td>
</tr>
</tbody>
</table>
### Leakage

<table>
<thead>
<tr>
<th>Study or Center, year</th>
<th>No. of cases</th>
<th>Leakage rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dillemans, 2009</td>
<td>2606</td>
<td>0.19 %</td>
</tr>
<tr>
<td>Durak, 2008</td>
<td>1,133</td>
<td>1.5 %</td>
</tr>
<tr>
<td>Gonzalez, 2007</td>
<td>3,018</td>
<td>2.1 %</td>
</tr>
<tr>
<td>Madan, 2006</td>
<td>300</td>
<td>3.0 %</td>
</tr>
<tr>
<td>Lee, 2007</td>
<td>3,828</td>
<td>3.9 %</td>
</tr>
<tr>
<td>Hamilton, 2003</td>
<td>210</td>
<td>4.3 %</td>
</tr>
<tr>
<td>Ballesta, 2008</td>
<td>1,200</td>
<td>4.9 %</td>
</tr>
<tr>
<td>DeMaria, 2002</td>
<td>281</td>
<td>5.1 %</td>
</tr>
<tr>
<td>Marshall, 2003</td>
<td>400</td>
<td>5.25 %</td>
</tr>
<tr>
<td>Carucci, 2006</td>
<td>904</td>
<td>5.3 %</td>
</tr>
</tbody>
</table>

### Mortality

<table>
<thead>
<tr>
<th>Study or center, year</th>
<th>No. of cases</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dillemans (lap), 2009</td>
<td>2606</td>
<td>0.04 %</td>
</tr>
<tr>
<td>Flum (lap) 2009</td>
<td>2975</td>
<td>0.2 %</td>
</tr>
<tr>
<td>Zingmond 2005</td>
<td>60077</td>
<td>0.33 %</td>
</tr>
<tr>
<td>Nguyen 2006</td>
<td>1144</td>
<td>0.4 %</td>
</tr>
<tr>
<td>Fernandez (lap) 2004</td>
<td>580</td>
<td>0.7 %</td>
</tr>
<tr>
<td>MacDonald (open) 1997</td>
<td>154</td>
<td>2.6 %</td>
</tr>
</tbody>
</table>
Know your complication rate
Bruges: 4000 consecutive lap RNY

- 2004 – 2007 cohort I
- 2008 – 2009 cohort II
4000 consecutive lap RNY

- Complication rate dropped

![Complication Rate Graph](chart)

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% of operations send to Medium/Intensive care

- 2006: last year of open RNY, open capella
- 2008: more revisions
Patients send to Medium/Intensive care

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Two questions

1. How to improve the outcome?
   – See other lectures: bleeding …

2. How to select the real risk patient?
   – BMI, age, …
Preventing complications

- Pneumonia 0.25%
- CPAP, re intubation and post op ventilation 0.21%
  - Reduce ventilation trauma
  - Spont assist breathing during end of procedure
  - Reduced abdominal inflation pressure according to Mulier model
  - Better surgical visibility and shorter operation
  - BMI > 50 is forced to reduce weight by diet
  - BMI > 60 gastric balloon for 6 months

- Obstruction 0.38%
  - Verify intestinal size with gastric tube
  - Gastroscopy per operative
  - More dangerous for lap banding, revisions

- Leak 0.17%
  - Choice of staple thickness is crucial
  - Method of stapling, waiting time...
  - High volume load test per operative
  - Extra stitches if suspicious places on the staple line
  - Per operative control better than one day post op control!

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On the abdominal pressure volume relation

Higher insufflation pressures needed

PV0 = 5

E = 4 mmHg/l

Insufficient intra abdominal volume

J Mulier, B Dillemans, M Crombach, C Missant, A Sels (2009)
On the abdominal pressure volume relationship.
Fitting of cross section abdomen when inflated at 15 (yellow) versus 25 (red) mmHg

- **Yellow:**
  - Long axis: 43.23 cm
  - Short axis: 30.00 cm
  - Circumference: 115.96 cm
  - Area: 1018 cm²

- **Red:**
  - Long axis: 40.80 cm
  - Short axis: 34.23 cm
  - Circumference: 118.08 cm
  - Area: 1097 cm²
Pig: abdominal pressure volume relation is not linear

- Zelfde spier relaxatie effect sevo en desfl

- JPMulier 2009
BMI effect on abdominal P/V relation

- J Mulier ISPUB 2009
  - Pressure volume relation is linear
  - \( PV_0 \) and \( E \) define each patient

- J Mulier IFSO 2007

**Effect of BMI on \( PV_0 \)**

**Effect of BMI on \( E \)**
Waist to Hip ratio (WHR)

- Man normal WHR: 0.9
- Woman normal WHR: 0.7

- Android fat distribution
  – WHR > 0.8
- Gynoid fat distribution
  – WHR < 0.8
What did man expect from woman:
Attractiveness in WHR from 4000 BC until 2000 AC
Android versus Gynoid fat distribution has a different Elastance

Abdominal pressure volume relation: Android vs Gynoid

Figure 1. Obesity phenotypes initially described by Vague in 1947. (adapted from 1)
Two types of android obesity

Intra visceral adiposity
Subcutaneous fat is scant and intra abdominal fat is thick and

Extra visceral adiposity
Subcutaneous fat is thick and intra abdominal fat is scant.
Large intra visceral fat volume, or liver steatosis makes the relation non linear!

- abdominal fascia is already circular instead of elliptic
  - No deformation possible
  - No radius decrease with increasing volume
Measure extra / intra abdominal fat
The obese patient is a challenge for anaesthesia if android shape with intra visceral fat.
How to change E: hip flexion

- Mulier JP, Dillemans B Obes Surg 2009
Only leg flexion affects $E$ in mmHg/L

$E: 3,6 \quad > \quad E: 2,6 \quad vol$

increase: 1100ml

Only table inclination affects $PV0$ in mmHg

$PV0: 4,8 \quad > \quad 4,1$

$> \quad 3,8$

vol increase: 200ml

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Effect of position on airway pressure \( \text{cmH}_2\text{O} \)

Worst

Best

Airway pressure in \( \text{cmH}_2\text{O} \):

- 27.6
- > 27.3
- > 25.4
- > 25
- > 24.4

\( P \) decreases with anti trendelenburg and leg flexion

No Medium/Intensive care for every intervention if

- Know your complication rate
  - No higher risk on ward for complications
- Pre operative screening for admission
  - Find high risk patients who need extra care
- Post operative evaluation at PAZA
  - In case of an unexpected surgical or anesthetic problem
- Only when pre OP existing co morbidities
  - Cardiac disease
  - Sleep apnoe needing Continuous CPAP mask
  - Other respiratory diseases
  - Neurologic problems
Medium/Intensive care needed

- Obesitas (BMI) itself is not an indication unless
- WHR > 1,2 and intra abdominal fat. (man!)
  - Past: balloon when BMI > 60
  - With diet should lose > 10 kg
- Not able to breath when laying flat in bed
- Sleep apnoe not treated well
Conclusion

How to improve medical treatment

- Reduce Complications, Improve safety.
- Improve pre operative functions: Weight reduction in the super super obese.
- Laparoscopic RNY surgery time less than 1 hour for a skilled surgeon (more than 300 RNY/year).
- Anesthesia induction and awakening time is very short for a skilled anesthetist (more than 300 bariatric anesthesias/year).

How to select high risk patient

Man with WHR > 1.2 and intra abd fat
- 5% Send to Med/Inten care only if needed
Remember: Patient type with a high mortality risk

- Elderly male diabetes patient with hypertension and being super obese, no weight loss.
  - Buchwald 2007

- Central abdominal fat, not stopped smoking, alcoholic
  - General risk

- Asthma and coronary artery disease
  - Cardio pulmonary risks

**Intensive treatment:**
ventilation support … is an other lecture