The Nutritional Considerations when Managing Post Bariatric Surgery Complications

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Specialist Dietitian
St Mary’s Hospital,
Imperial College Healthcare
Imagine the Scenario

A patient weighing 180kg (BMI 62) is admitted to ICU

Post gastric bypass with an anastomotic leak

NBM for a number of weeks

Should we feed?

If yes, how much and which route?

How rare is the occurrence?
What is the likelihood of this happening?

No UK data yet

BOMSS National registry results due next year

USA data
(200,000 procedures in 2007 & 1,100 bariatric surgeons)
Data on 4610 patients over a 3 year period (2005-2007)
33 Centres in the US
Included: Roux en Y gastric bypass & gastric band.
Excluded: BPD/DS, Sleeve Gastrectomy & vertical banded gastroplasty
### Adverse Outcomes within 30 days after surgery.
#### NEJM 2009

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Total (N=4610)</th>
<th>Laparoscopic Gastric bypass (N=2975)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Death</strong></td>
<td>15 (0.3%)</td>
<td>6 (0.2%)</td>
</tr>
<tr>
<td><strong>DVT</strong></td>
<td>20 (0.4%)</td>
<td>12 (0.4%)</td>
</tr>
<tr>
<td><strong>Intubation</strong></td>
<td>20 (0.4)</td>
<td>12 (0.4%)</td>
</tr>
<tr>
<td><strong>Endoscopy</strong></td>
<td>51 (1.1%)</td>
<td>45 (1.5%)</td>
</tr>
<tr>
<td><strong>Tracheostomy</strong></td>
<td>11 (0.2%)</td>
<td>6 (0.2%)</td>
</tr>
<tr>
<td><strong>Drain insertion</strong></td>
<td>16 (0.3%)</td>
<td>13 (0.4%)</td>
</tr>
<tr>
<td><strong>Abdominal operation</strong></td>
<td>118 (2.6%)</td>
<td>94 (3.2%)</td>
</tr>
<tr>
<td><strong>Failure to be discharged by day 30</strong></td>
<td>189 (4.1%)</td>
<td>13 (0.4%)</td>
</tr>
<tr>
<td><strong>Total % that might require nutritional support</strong></td>
<td>216/ 4610 (4.6%)</td>
<td>170/ 2975 (5.7%)</td>
</tr>
</tbody>
</table>
Major Complications with Nutritional Consequences

- Anastomotic Leak (BP, BPD/DS, SG)
- Perforated stomach/Bowel (All)
- Gastrointestinal Haemorrhage (All)
- Eroded bands
- Bowel obstruction (All)
- Gastrogastric fistulas (BP)
- Non- NICE compliant BMI < 35 (All)
Location of leaks

- Gastro-jejuno anastomosis (most frequent)
- Gastric pouch staple line
- Jenu-no-jejuno anastomosis
Nutrition & Leaks

NBM

Nil nutrition at site of anastomotic leak

Duration?
(Experience 4-12 weeks)

Enteral feeding or parenteral nutrition?
Routes of feeding

- NJT via a stent
- PEG in Stomach remnant
- Surgical jejunostomy
- TPN for bowel rest
Nutritional Journey Prior to Surgery
Some centres ask patients to lose weight prior to surgery.

Usually 10% of excess body weight.

Diets followed not always sound.
Pre-op Diet

BMI > 60 could have been on 12 week VLCD 1000kcals / day or less
Low carbs & fat

Aimed at glycogen depletion & liver shrinkage

Approx 6kg Wt loss in 2-3 wks

2-4 weeks usual duration
Micronutrient status in those awaiting bariatric surgery

Iron deficiency
- 44% of patients BMI >50
- More common in < 25yrs - 78%
  (Flancbaum 2006)

Vit D deficiency
- Seen in up to 60-80%
  (Buffington 1993, Slater 2004, Flancbaum 2006, Ernst 2009)

B vitamins
- Folate, B12, thiamin
  - Deficiency seen in up to 20% of patients
    (Boyland 1988, Ernst 2009)

Zn, Se, Vitamin A, E, and C
- Depletion of all seen in > 10% of patients
  (Ernst 2009)
What normally happens post op?
# Post Operative Diet Plan

<table>
<thead>
<tr>
<th>Stage</th>
<th>Texture</th>
<th>Duration</th>
<th>Approx intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Liquids</td>
<td>2 weeks</td>
<td>800kcals, 50g protein</td>
</tr>
<tr>
<td>2</td>
<td>Blended / puree</td>
<td>2 weeks</td>
<td>600kcals, 40g protein</td>
</tr>
<tr>
<td>3</td>
<td>Soft moist</td>
<td>2 weeks</td>
<td>800kcals, 50g protein</td>
</tr>
<tr>
<td>4</td>
<td>Normal</td>
<td>By 8-12 weeks</td>
<td>1000kcals, 50g protein</td>
</tr>
</tbody>
</table>

**N.B:** Type and duration individual to surgeon/centre

AACE/TOS/ASMBS Bariatric Surgery Guidelines 2008
Back to our patient in the ICU
What is the role of Nutrition Support Post bariatric surgery?

- Preserve LBM
- Avoid overfeeding
- ? achieve weight loss
- Not different to non obese
- Promote healing
Do they really need to be fed?

Can’t they live off their fat?
How much...
Predicting basal metabolic rate in the obese is difficult

GW Horgan¹* and J Stubbs²

¹Biostatistics and Biometry, Aberdeen, UK; and ²Rowett Research Institute, Aberdeen, UK
36 patients
75% ventilated
Compared: HB, IJ, Mifflin, 21/kg, 25/kg
Mean BMI: 38 (30-59kg/m²)
<table>
<thead>
<tr>
<th>Prediction Strategy</th>
<th>Ventilator-Dependent Patients (n = 27)</th>
<th>Spontaneously Breathing Patients (n = 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within ±10% MREE</td>
<td>Bias ± Precision</td>
</tr>
<tr>
<td>Harris-Benedict using $BW_{\text{actual}}$</td>
<td>37.0</td>
<td>191.4 ± 477.4</td>
</tr>
<tr>
<td>Harris-Benedict using $BW_{\text{adj}}$</td>
<td>11.1</td>
<td>555.7 ± 390.4</td>
</tr>
<tr>
<td>Harris-Benedict using $BW_{\text{ave}}$</td>
<td>3.7</td>
<td>435.2 ± 412.5</td>
</tr>
<tr>
<td>Harris-Benedict using $BW_{\text{actual}}$ with stress factor</td>
<td>14.8</td>
<td>−787.8 ± 570.3</td>
</tr>
<tr>
<td>Harris-Benedict using $BW_{\text{adj}}$ with stress factor</td>
<td>48.2</td>
<td>−241.3 ± 422.4</td>
</tr>
<tr>
<td>Harris-Benedict using $BW_{\text{ave}}$ with stress factor</td>
<td>44.4</td>
<td>−422 ± 460.7</td>
</tr>
<tr>
<td>Mifflin–St. Jeor</td>
<td>14.8</td>
<td>310.6 ± 452.4</td>
</tr>
<tr>
<td>Ireton-Jones for obesity</td>
<td>3.7</td>
<td>−693.9 ± 477.5</td>
</tr>
<tr>
<td>Ireton-Jones for spontaneously breathing patients$^a$</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Ireton-Jones for ventilator-dependent patients$^a$</td>
<td>37.0</td>
<td>152.3 ± 399.1</td>
</tr>
<tr>
<td>21 kcal per kg $BW_{\text{actual}}$</td>
<td>48.2</td>
<td>−137.6 ± 615.5</td>
</tr>
<tr>
<td>25 kcal per kg $BW_{\text{adj}}$</td>
<td>37.0</td>
<td>221.5 ± 430.8</td>
</tr>
<tr>
<td>25 kcal per kg $BW_{\text{actual}}$</td>
<td>25.9</td>
<td>−576.6 ± 678.8</td>
</tr>
</tbody>
</table>

MREE, measured resting energy expenditure; bias, mean difference between MREE and method (MREE – prediction strategy result); precision, SD of bias; r, correlation coefficient; $BW_{\text{actual}}$, actual body weight (kg); $BW_{\text{adj}}$, adjusted body weight (kg); $BW_{\text{ave}}$, average body weight (kg). Dashes indicate not applicable.

$^a$For Ireton-Jones for spontaneously breathing patients, n = 9; for Ireton-Jones for ventilator-dependent patients, n = 27.
Assessment of resting energy expenditure of obese patients: Comparison of indirect calorimetry with formulae

Valéria Girard Fabiano Alves, Eduardo Eiras Moreira da Rocha, Maria Cristina Gonzalez, Rosana Barcellos Vieira da Fonseca, Mônica Hissa do Nascimento Silva, Carlos Alberto Chiesa

44 patients
Ave: BMI 36 (27-53kg/m2)
18% post bariatric surgery
Majority were ventilated.

Compared HB, IJ & 21/kg
Best REE predictor in fasting & fed state:

HB actual Wt
21/kg – over-est 10%
Energy Requirements / Sensible Conclusions

- No one equation can be advocated
- Rely on estimates as starting point
- Modest reduction in energy during the acute phase
- Avoid excess glucose to avoid hypercapnia
- Need adequate energy to ensure protein sparing but the amount still unknown
- N.B – Calories from propofol (e.g. 450mg/hr = 1080kcals)
If decreasing calories, need sufficient protein to achieve N2 balance & healing

Exact protein needs post bariatric surgery not yet defined

1.1g/kg IBW – bypass adequate to maintain LBM (Moize 2003)

Increases by 30% to accommodate for malabsorption post BPD/DS- (Slater 2004)

PEN Group

- 75% if BMI > 30 / 65% if BMI > 50

Challenges: Meet calories or protein requirements
Relationship between fluid & electrolytes requirements & weight is not linear
- 35ml/Kg (PENG) not appropriate
- Critical illness can lead to retention of salt & water
- Restricting fluid can lead to inadequate nutrition
- GIFTASUP (IV fluids adult surgical pts)
- Consider hydration, UO, losses, clinical condition
- Careful monitoring
**Do we need to worry about vitamins & minerals?**

**Thiamin**
Deficiency develops early first few months, after intractable vomiting. Has been seen after only 2 wks of persistent vomiting.

**Iron**
Depends on pre-op levels. Deficiency shouldn’t develop until 6 months.

**B12**
Commonly seen at 6-12/12 as liver stores depleted.

**Calcium & Vit D**
Deficiency seen after 1 year.

**Answers**
Need about 2000kcals of feed to meet post surgery requirements.
Managing patient expectations

Maintaining nutritional status

On going weight loss
Beware of mixed messages

Aggressive Nutritional Support

Healthy eating for long term weight loss
## Guide to weight loss post BP/BPD/DS procedures

<table>
<thead>
<tr>
<th></th>
<th>Per week</th>
<th>Per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/12</td>
<td>1.5-3kg</td>
<td>6-12kg</td>
</tr>
<tr>
<td>3-9/12</td>
<td>0.77-1.5kg</td>
<td>3-6kg</td>
</tr>
<tr>
<td>9-12/12</td>
<td>0.77kg</td>
<td>3kg</td>
</tr>
</tbody>
</table>

AACE/TOS/ASMBS Bariatric Surgery Guidelines 2008
Case Studies
Mr B

- 46 year old male
- Gastric bypass
- Start wt: 158kg/ BMI 51
- IBW 78kg (BMI 25)
- EBW 80kg
- Wt at surgery: 145kg
- Day 2 – gastro-jejuno leak
  – back to theatre. Feeding jej inserted. ARDS / ICU
Requirements

- $19 \times 145\text{kg} = 2755\text{kcals}$
- BMR (act wt) $= 2540\text{kcals}$
- BMR (adj wt) $2149 + 10\% SF = 2364\text{kcals}$
- Protein: $0.2 \times 145 = 29\text{gN/181g}$
  ($65\%$) $= 117\text{g protein}$
- $1.1 \times IBW 78\text{kg} = 85.8\text{kg}$
- Plan: $2100\text{kcals}, & 105\text{g protein}$
Patient journey

- Home enteral feed
- Insisted on reduced calories
- 1500 kcals, 75g protein
- Total feeding time - 12 weeks
- Wt at 3/12 = 129 kg
- Lost 16 kg – (1.3 kg/week)
- Well. Nil abnormal bloods
Mrs S

- 25 year old female
- Sleeve Gastrectomy
- Start wt: 235kg/ BMI 81
- IBW 72kg (BMI 25)
- EBW 163kg
- Wt at surgery: 212kg
- Day 2 – developed leak – conservative management
- TPN
Requirements

- 19-21x 212kg = 4028-4452 kcal
- BMR (act wt) = 3624 kcals
- BMR (adj wt) = 2633 + 10% SF + 20% AF = 3423 kcals
- Protein: 0.2x212kg = 42g N (65%) = 27g N / 172g protein

Plan: 2400 kcals & 14g N (plus glutamine)
Patient journey

- 4 weeks on PN
- Stent inserted – liquids only for 2/52
- Struggled to take prescribed supplement drinks.
- Max intake: 1500kcals, 50g protein
- Wt at 5 wks – 190kg, lost 22kg
- 4.4kg/wk – very fast
- Patient feeling very unwell, tired & fatigued
- Nutritional bloods remained normal
References

References

Questions & Answers
Whether you are a current reporter or not you are invited to bring your packed lunch and join members of the BANS committee to have your say about:

- How we collect non-consented BANS data in future;
- How BANS data can be interfaced with local data bases;
- What reports individual Trusts require;
- What needs to be done to maintain and increase the Reporter base;
- How we collect the additional data required by the HIFNET strategy.

TODAY: Novello Suites 1 & 2
13.15 – 14.00