VITAMIN AND MINERAL SUPPLEMENTATION AFTER BARIATRIC SURGERY

Adam Bryant, B.Sc, B.A.Sc, RD
Bariatric Program
St Joseph’s Healthcare Hamilton
Disclosures

- I have no disclosures to make
Overview

- Bariatric Surgery in Ontario
- Etiology and prevalence of micronutrient deficiency
- Managing micronutrient deficiency
  - Prevention
  - Treatment
  - Practical Considerations
- Future Research
Bariatric Surgery in Ontario

- Vertical Sleeve Gastrectomy (VSG)
- Roux-en-Y Gastric Bypass (RYGB)
- Duodenal Switch (DS)

Image source: Ethicon Endo-Surgery, INC.
Etiology of Micronutrient Deficiency

- Reduced Absorption
- Reduced Availability from Food Sources
- Reduced Dietary Intake
- Food Intolerances
- Type of Surgery
- Lack of balance in post-op diet
## Common Deficiencies

<table>
<thead>
<tr>
<th>Micronutrient</th>
<th>VSG</th>
<th>RYGB</th>
<th>DS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>?</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Vitamin B1*</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>?</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Iron**</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

* Increased with persistent vomiting
** Rates higher for menstruating women
? Unclear
+ Low prevalence
++ Moderate prevalence
+++ High prevalence

Adapted from:
1) Kushner - ASPEN 2012 presentation
Clinical Practice Guidelines


Managing Micronutrient Deficiency

- Micronutrient deficiencies are predictable and preventable
- Supplementation is for life
- Routine screening is imperative
- Educating patients and staff about signs/symptoms of deficiency is important
- CPG documents offer similar prevention/treatment recommendations though doses vary
# Routine Daily Supplementation

<table>
<thead>
<tr>
<th>Supplement</th>
<th>RYGB</th>
<th>DS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multivitamin</td>
<td>200% DRI</td>
<td>200% DRI</td>
</tr>
<tr>
<td>Additional Iron*</td>
<td>40-65 mg</td>
<td>40-65 mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>1200-2000 mg</td>
<td>1800-2400 mg</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>400-800 IU</td>
<td>2000 IU</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>350-500 mcg</td>
<td>350-500 mcg</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>-</td>
<td>10,000 IU</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>-</td>
<td>400 IU</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>-</td>
<td>300 mcg</td>
</tr>
<tr>
<td>B complex</td>
<td>optional</td>
<td>optional</td>
</tr>
</tbody>
</table>

* For menstruating women

Adapted from Aills et al. 2008 & Mechanick et al. 2008
Thiamin (B1)

- **Prevention**
  - Multivitamin providing 200% DRI recommended for prevention
  - Persistent vomiting over weeks/months can precipitate deficiency

- **Screening**
  - Diagnosis often based on clinical presentation
  - Can test serum thiamin and erythrocyte transketolase activity to confirm

- **Treatment**
  - Prophylactic supplementation for patients with persistent vomiting
    - 50-100 mg/day oral thiamine OR 100 mg IM thiamine
  - Aggressive medical intervention for patients presenting with symptoms
Iron

- **Prevention**
  - 1-2 adult multivitamins daily, each containing at least 18 mg iron
  - Menstruating women need additional iron
    - 40-65 mg elemental iron (in addition to iron in MVI)

- **Screening**
  - First detected through decreased serum ferritin
  - Other iron indices change with advancing deficiency

- **Treatment**
  - 300 mg ferrous sulfate up to 3x/day
  - Advanced deficiency may require IV iron infusions
Vitamin B12

- **Prevention**
  - 350-500 mcg/day crystalline B12, either orally or sublingually
  - or 1000 mcg/month IM injection

- **Screening**
  - Serum B12
  - Increased homocysteine and/or methylmalonic acid

- **Treatment**
  - 1000 mcg/week IM x 8 weeks
Calcium and Vitamin D

- **Prevention**
  - 1200-2000 mg calcium citrate
  - 400-800 IU vitamin D

- **Screening**
  - 25-OH vitamin D
  - PTH, alkaline phosphatase, bone mineral density scan?

- **Treatment**
  - Mild deficiency – 4000-6000 IU/day
  - Advanced deficiency – 50,000 IU/week vitamin D2 x 8 weeks
Vitamin A

- **Prevention**
  - Routine multivitamin (no additional A for RYGB)

- **Screening**
  - Plasma retinol < 1.05 umol/L indicates sub-optimal vitamin A status*
  - Plasma retinol < 0.70 umol/L indicates vitamin A deficiency*

- **Treatment**
  - Mild deficiency – 10,000 IU/day oral vitamin A x 1-2 weeks
  - Advanced deficiency may require high-dose IM vitamin A

Practical Considerations

- Patient tolerance and preference
- Practical dosing
- Correct timing
- Cost to patient
- Brands & Availability

<table>
<thead>
<tr>
<th>Time</th>
<th>Sample Supplement Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>Multivitamin x 2</td>
</tr>
<tr>
<td></td>
<td>Vitamin B12</td>
</tr>
<tr>
<td>Lunch</td>
<td>Calcium (500-600 mg)</td>
</tr>
<tr>
<td></td>
<td>Vitamin D (200-400 IU)</td>
</tr>
<tr>
<td>Mid-Afternoon</td>
<td>Calcium (500-600 mg)</td>
</tr>
<tr>
<td></td>
<td>Vitamin D (200-400 IU)</td>
</tr>
<tr>
<td>Supper</td>
<td>Calcium (500-600 mg)</td>
</tr>
<tr>
<td></td>
<td>Vitamin D (200-400 IU)</td>
</tr>
<tr>
<td>Bedtime</td>
<td>If needed</td>
</tr>
</tbody>
</table>
Future Research

- Incidence of micronutrient deficiency after VSG
- Optimal formulations/doses/timing for micronutrient replacement
- Establishing clear guidelines for “deficiency” and when to start treating
- Factors influencing compliance with supplements
Future Research in Ontario

- Ontario Bariatric Network Dietitian Task Force
  - “Consensus Recommendations for Vitamin and Mineral Supplementation after RYGB Surgery”

- A. Buckley, K. MacKinnon, T. Marcoux and K. Loney
  - “A Systematic Literature Review of Iron Supplementation for Post-Roux-en-Y Gastric Bypass Patients”

- Chart reviews
Summary

- Micronutrient deficiency is a predictable and preventable consequence of bariatric surgery
- Routine supplementation is crucial
- Understanding how to screen for, identify and treat deficiencies is also crucial
- Future research will hopefully help to standardize prevention and treatment strategies
Acknowledgements

- Dr Mehran Anvari
- Stephanie Kirsic, RD
- Lori Hollett, RD
- Jennifer Brown, RD
- Sue Ekserci, RD
- OBN Dietitian Task Force