

Bariatric Surgery: Common Post-op Complications

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Bariatric Surgery Webinar Part II

January 11, 2016



Presenter Disclosure

- Honorarium from DC – DOC Network



Webinar Series Objectives

Webinar #3
Advanced Bariatric Nutrition

Webinar #2
Common Post-op Complications

Webinar #1
Understanding Bariatric Surgery Process



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Les diététistes du Canada
Diabetes, Obesity and Cardiovascular Network



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Ontario Family Health Teams Network

Objectives

- Brief review of surgical procedures
- Post-op complications
- Post-op nutrition requirements
 - Diet progression, protein, fluids
 - Vitamin/mineral supplements
- Identify and treat vitamin/mineral deficiencies
- Questions and discussions



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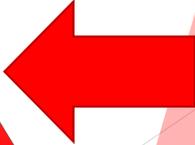
Bariatric Surgery Interventions

Disease Progression

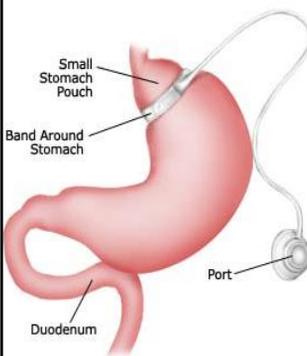
Bariatric Surgery
(RYGB, SG,
BPD-DS)

Pharmacotherapy
(Orlistat or Liraglutide 3mg)

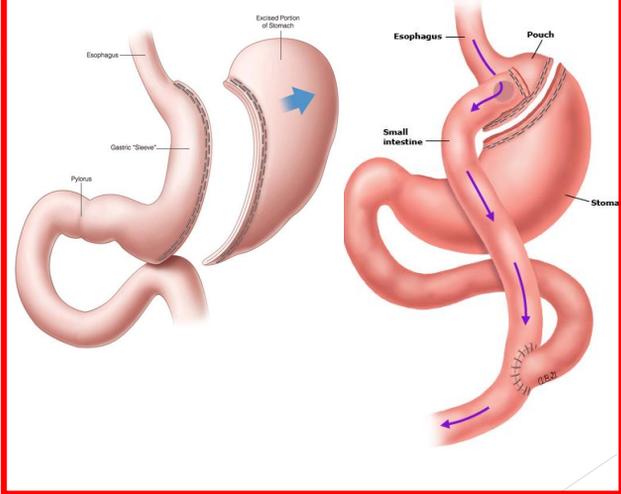
Healthy Eating Physical Activity
Stress Management
Sleep Hygiene



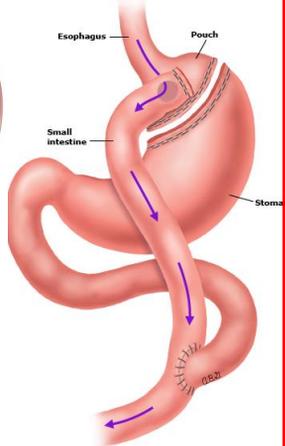
Adjustable Gastric Band (AGB)



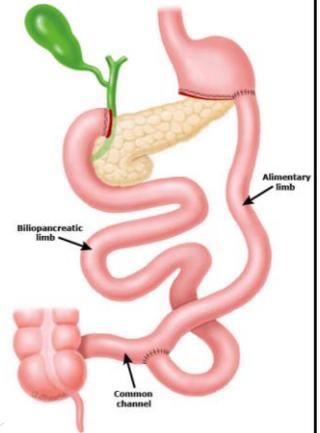
Sleeve Gastrectomy (SG)



Roux-en-Y Gastric Bypass (RYGB)



Biliopancreatic Diversion w/ Duodenal Switch (BPD/DS)



Risks of Bariatric Surgery

Early Complications

- Bowel obstruction
- DVT
- GI/Intra-abdominal bleeding
- Leaks
- Pulmonary embolism
- Wound infection

Late Complications

- Anastomotic stricture
- Cholelithiasis
- Fistula
- Incisional hernia
- Marginal ulcer
- Nutrition deficiencies
- Weight regain / recurrence of comorbidities

Post-Surgery Complications

- **Anastomotic stricture**
 - Narrowing of gastro-jejunal anastomosis or jejunal-jejunal anastomosis
 - Restricts food intake
 - White-frothy foam, vomiting
 - Within first 3 months
 - Requires dilations



Nutrition Recommendation:

- Return to pureed/liquid stage diet
- Progress diet as tolerated
- Ensure progression to solid foods
- Eat slowly, chew well
- Stress reduction techniques

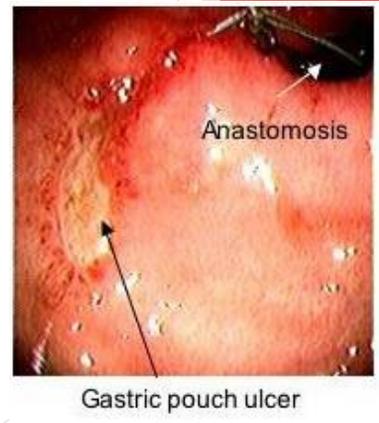
Post-Surgical Complications

Ulcers of the stomach or anastomosis (marginal ulcers)

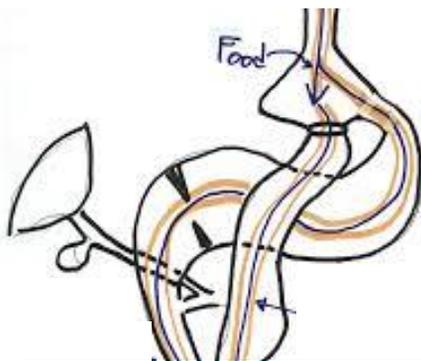
- Upper epigastric pain, burning, radiating to the back
- Symptoms of nausea, vomiting and food intolerances.
- IDA commonly associated with chronic ulcers
- Avoid tobacco, alcohol, caffeine, aspirin and NSAIDS

Nutrition Recommendation:

- Return to pureed/liquid stage diet (as tolerated)
- Increase protein intake
- Adjust supplements (chewable/liquid – pending tolerance)



Post-Surgery Complications



Common in RYGB
patients >10 yrs post-op

Surgical revision required

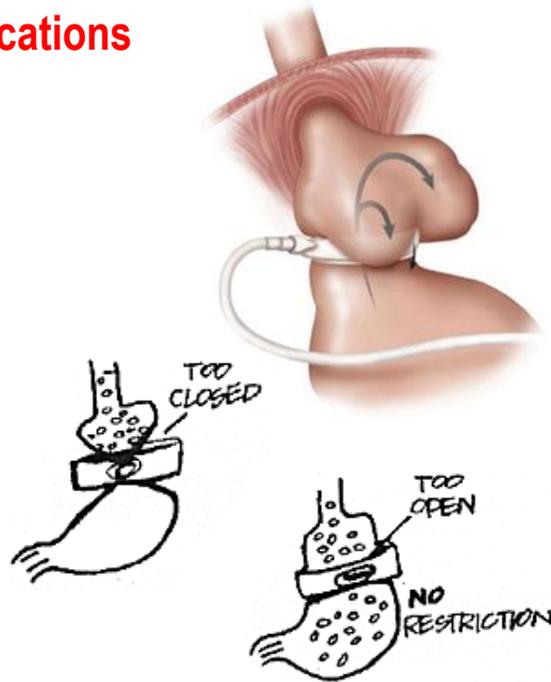
Gastro-gastric fistula

- Failure or incomplete staple partition of the pouch
- Patients report high volume of solid food, lack of restriction, lack of satiety, tolerance to sticky, doughy, stringy, tough foods
- Common to see weight re-gain or poor weight loss

Post-Surgery Complications

Lap Band Complications

- Band too tight/loose
- Band/port slippage
- Band erosion
- Band/tubing leakage



Post-Surgery Nutrition Complications

RYGB / SG

- Dehydration
- Diarrhea
 - Lactose intolerance
 - Dumping syndrome
- Constipation
- Food intolerances
- Protein malnutrition
- Vitamin/Mineral deficiencies
- Weight regain
- Reactive hypoglycemia
- Failure-to-thrive
- Eating disorders
(disordered eating behaviours)

Nick

- 2 months post-RYGB
- c/o: Nausea, vomiting after meals
- s/s: appears well, wt lost = 30 lbs, afebrile, no pain, abd soft and non-tender

Eating Habits:

- Eats in a hurry
- Not chewing adequately
- Often mixing some fluid with solid meal

Case Study: Nick

- Most common complaint after bariatric surgery
- **Dx: dietary non-compliance**
- Eat undisturbed
- Chew meticulously
- Avoid drinking after solid meals (30 min)
- Follow-up in 1-2 weeks to ensure problem resolved

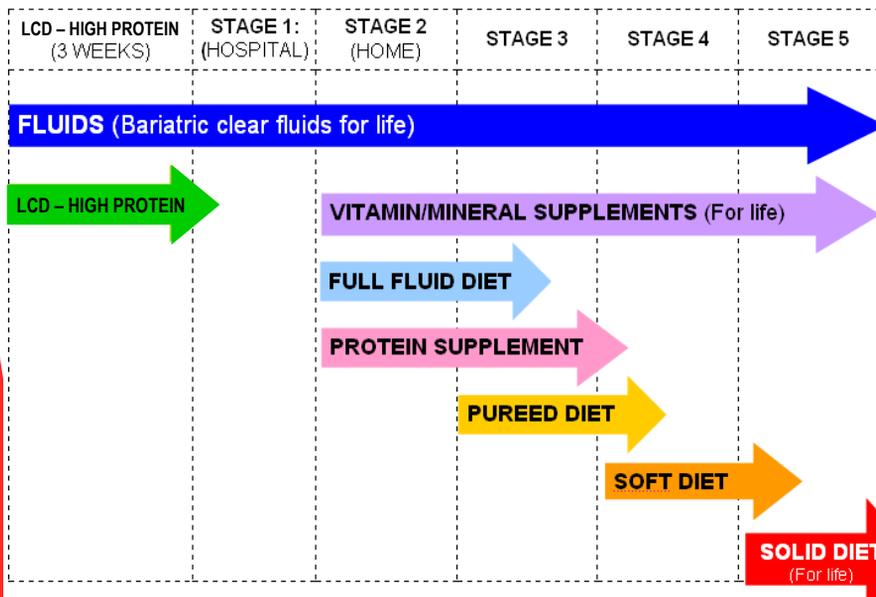
Careful to consider other causes:

- Stricture
- GERD
- Anastomotic ulcers
- Medications

Post-op Dietary Requirements

- Diet progression (CL → FF → Pureed → Soft → Solids)
- Protein intake
- Fluid requirements
- Vitamin/mineral supplementation

Diet Progression



- Progression varies
- 4 weeks – 8 weeks from stage 1-5
- Interchangeable stages
- Considers fluid, macro- and micro-nutrient needs

Nutrition Tips during Diet Progression

- Normal to jump back and forth between stages
- Treat the pouch like a baby
- Add some carbohydrates to each diet stage
- Be creative with protein intake
- Hide Greek yogurt, pureed beans/lentils and protein powder in everything!



Protein Intake

- Individualized and assessed by RD
- Minimum requirements:
 - 60g/day
 - 1.0-1.5g/kg IBW/day
- Men: 70-120 g/day
- Women: 60-90 g/day

Fluid Requirements

- Adequate hydration (1.5-2L/day)
 - Women: 1.5L minimum
 - Men: 2L minimum
- 50% of fluids = protein-containing full liquids
- 50% of fluids = clear liquids (3-C's)
 - Calorie-free
 - Caffeine-free
 - Carbonation-free

Vitamin & Mineral Supplements

- Early post-op: supplements should be chewable, liquid or crushed (NO GUMMIES)
- Multivitamin/mineral supplement MOST important
 - Risk for thiamine deficiency (<3 months post-op)
- As food intake increases → pill/tablet supplements adequate
- Biochemistry monitoring and patient adherence required.

Post-op Vitamin/Mineral Recommendations

	2008 ASMBS Nutrition	2010 Endocrine Society	2013 ASMBS/TOS/AACE	AND Pocket Guide (2015)
Multivitamin/mineral	2 MV (≥18 mg iron, folate, selenium, zinc)	1-2 MV (iron/folate)	2 MV (iron, folate, B1)	2 chewable (200% DRI)
Vitamin B12	350-500 mcg/d oral 1000 mcg/mo IM injections	Not specified	As needed to maintain B12 levels (1000 mcg/d oral)	350-500 mcg/d oral/sublingual or 1000 mcg/mo IM
Calcium	1500-2000 mg Ca ⁺ citrate	1200-2000 mg Ca ⁺ carbonate or citrate	1200-1500 mg Ca ⁺ citrate	1200 mg/d men/pre-meno women 1500 mg/d post-meno women Calcium citrate
Vitamin D	2000 IU combined sources	Not specified (calcium supplements with vitamin D)	≥ 3000 IU/d	3000 IU/d (all supplement sources)
Iron	Min. 18-27 mg/d 50-100 mg/d (at risk)	Not specified	40-65 mg (combined MV/additional iron)	45-60mg/d menstruating women
Other	B-50 (>1000 mg/d folate in supplements may mask B12 deficiency)	Screen for B1, vitamin K and vitamin A	2 mg/d Copper (as routine MV)	

Multivitamin/mineral Supplement

- 200 % DRI
- equal vitamin to mineral list
- 2.2 mg vitamin B1 (thiamine)
- <1000 mcg folate
- 15 mg zinc
- 2 mg copper
- contain **vitamin K, biotin, selenium**

Supplement Facts

Vitamin & Mineral Supplements after RYGB or SG

	Amount required per day
Vitamins	
Vitamin A	5000-10,000 IU
Vitamin B1 (Thiamine)	2.2 mg
Vitamin B2 (Riboflavin)	3.4 mg
Vitamin B3 (Niacin)	40 mg
Pantothenic acid (B5)	20 mg
Vitamin B6	4 mg
Vitamin B12	500-1000 mcg
Folate	Under 1000 mcg
Biotin	60 mcg
Vitamin C	120 mg
Vitamin D	3000-4000 IU
Vitamin E	60 IU
Vitamin K	160 mcg
Minerals	
Calcium Citrate	1200-1500 mg
Iron*	45-60 mg
Zinc	15 mg
Copper	2 mg
Selenium	140 mcg
Magnesium	400 mg
Manganese	4 mg
Chromium	120 mcg
Molybdenum	50 mcg

Mechanick, JI., et al. SORD. 2013; 159-191
 Cummings, S & Isom, K. 2014. Academy of
 Nutrition and Dietetics Pocket Guide to Bariatric
 Surgery, 2nd ed

Calcium

- elemental form (Citrate)
- 1200-1500 mg/day
- split into 500 mg doses
- avoid taking <2 hrs from iron

Vitamin D

- total of 3000 IU (from all supplements)

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Vitamin B12

- 500-1000 mcg sublingual tablet
- 400 mcg sublingual spray
- 1000 mcg IM/mo or
3000 mcg IM/q 6mo

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Elemental Iron

- multivitamin >18mg/pill is sufficient for men/postmenopausal women
- menstruating women or patients with hx of iron deficiency need 45-60 mg/d
- vitamin C increases iron absorption
- avoid taking <2hrs from calcium

Supplement Facts

Vitamin & Mineral Supplements after RYGB or SG

	Amount required per day
Vitamins	
Vitamin A	5000-10,000 IU
Vitamin B1 (Thiamine)	2.2 mg
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Vitamin B3 (Niacin)	40 mg
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- Recommendations NOT Treatment
- Treatment is based on assessment, laboratory findings and physical symptoms

Vitamin & Mineral Requirements for Patients after Bariatric Surgery Roux-en-Y Gastric Bypass & Sleeve Gastrectomy

After bariatric surgery procedures (Roux-en-y gastric bypass or sleeve gastrectomy), vitamin and mineral absorption is compromised as the GI tract is altered. Patients need to take a number of vitamin/mineral supplements for life and have their micronutrient levels measured regularly. Supplementation recommendations should be individualized for each patient based on their specific nutritional intake and status. Here are some standard recommendations for supplementation.

Supplement Facts

Vitamin & Mineral Supplements after RYGB or SG

	Amount required per day
Vitamins	Daily Requirements
Vitamin A	5000-10,000 IU
Vitamin B1 (Thiamine)	3 mg
Vitamin B2 (Riboflavin)	3.4 mg
Vitamin B3 (Niacin)	40 mg
Pantothenic acid (B5)	20 mg
Vitamin B6	4 mg
Vitamin B12	500-1000 mcg
Folate	Under 1000 mcg
Biotin	60 mcg
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**Ferrous sulfate, fumarate, gluconate

RYGB = Roux-en-Y gastric bypass;
SG = Sleeve gastrectomy

- 1) **Multivitamin-mineral (MVM) supplement:**
 - Early post-op (0-3 months), chewable, liquid or crushed supplements are recommended.
 - Once patients are able to tolerate solid foods: tablet or capsule supplements can be used.
 - Patients need 1-2 pills/day (see supplement facts on the left for daily requirements)
 - Should have equal vitamins to minerals (complete MVM).
 - Each pill should have a minimum:
 - 1.2 mg Thiamine (vitamin B1)
 - Under 500 mcg Folate
 - 7.5 mg Zinc
 - 1 mg Copper
- 2) **Vitamin B12:**
 - 500 - 1000 mcg/day oral or sublingual or;
 - 1000 mcg/month intramuscularly.
 - Avoid time-released
- 3) **Calcium:**
 - Calcium citrate is preferred
 - 1200-1500 mg/day
 - Take in divided doses of 500-600 mg
 - Avoid taking within 2 hours of supplements containing iron.
- 4) **Vitamin D:**
 - 3000-4000 IU/day (total from all supplements)
- 5) **Elemental Iron:**
 - Iron in multivitamin is typically sufficient for most patients (men and post-menopausal women)
 - Look for supplements with 18mg iron/dose.
 - 45-60 mg/day (for menstruating women)
 - Ferrous sulfate is preferred
 - Avoid taking within 2 hours of calcium supplement.

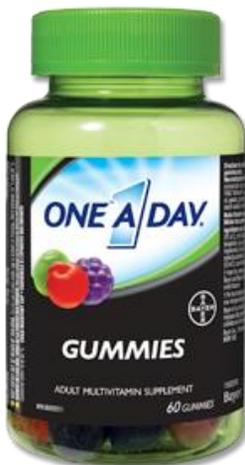
Ryan

- 2 years post-RYGB
- c/o: nausea, dizziness, fatigue, memory loss, off gait
- No updated biochemistry data
- **Fluids:** 1-1.5 L/day (water, decaf coffee, diluted juice)
- **Supplements:** on/off for past year; now taking 2 Multivitamin (One-a-Day® Adult Gummies) + 500 mcg vitamin B12 + 1000 IU vitamin D; forgets to take calcium
- **Food intake:** Limited fruits/vegetables + 1-2oz protein/meal + few bits of starches/grains (no bread or pasta). Noticed a decline in food intake x 3 months
- **Protein intake:** 40-60g/day (Greek yogurt, cottage cheese, eggs, tuna, nut butters, protein bars). Unable to tolerate chicken/beef

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Ryan – Case Study



Contains:

Vitamin A	1000 IU
Vitamin B6	2 mg
Vitamin B12	6 mcg
Vitamin C	20 mg
Vitamin D	200 IU
Vitamin E	10 IU
Folate	100 mcg

High risk for thiamine deficiency

Supplement Facts

Vitamin & Mineral Supplements after RYGB or SG

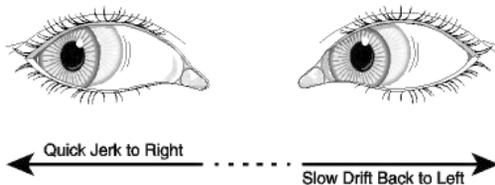
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Molybdenum	50 mcg

Screening for Thiamine Deficiency

- Pt reports limited food intake, not adhering to multivitamins, supplements lacking B1, **persistent vomiting**, rapid weight loss, parenteral nutrition, excessive alcohol intake
- s/s of beriberi, Wernicke's encephalopathy
 - Irreversible neuromuscular disorders, peripheral nervous system involving bilateral impairment of sensory, motor, and reflex functions, learning defects, short-term memory loss, coma, death
- Blood tests – serum thiamine may NOT detect B1 deficiency

Screening for Thiamine Deficiency

- In your office:
 - Watch pt walk – ataxia, gait, holding wall/chair
 - Eye contact – pt unable to focus, horizontal nystagmus
 - Confusion, disorientation, inability to concentrate, slurred speech, forgetting words



Rx Thiamine Deficiency

- Mild deficiency:
 - 100 mg thiamine 2-3 x/day until symptoms resolve (3- 6 months) OR IV thiamine: 100 mg/day x 7-14 days
- Severe deficiency (suspected or established):
 - IV thiamine: 500 mg/day x 3-5 days + 250 mg/day x 3-5 days (or until s/s resolved) + 100 mg/day po indefinitely
- **CAUTION:**
 - Do not use glucose with IV thiamine
 - Consider antibiotics in recurrent cases (risk of small intestine bacterial overgrowth)

Deficiencies

Sleeve Gastrectomy (SG)

Calcium
Phosphorus
Magnesium
Iron
Copper
Selenium
Thiamin
Riboflavin
Niacin
Biotin
Folate
Vitamins A, D, E, K

Lipids
Monosaccharides
Amino acids
Small peptides

Vitamin C
Folate
Vitamin B12
Vitamin D
Vitamin K
Magnesium
Others*

Water

Vitamin K
Biotin

Esophagus

Stomach

Duodenum
= 30cm or 1-foot

Jejunum
= 244cm or 8-feet

Ileum
= 365cm or 12-feet

Large Intestine
= 150cm or 5-feet
Water

Water
Ethyl a
Copper
Iodide
Fluorid
Molyb

Thiamin
Ribofla
Niacin
Pantot
Biotin
Folate
Vitamin
Vitamin
Vitamin
Calcium
Phosph
Magnesi
Iron
Zinc
Chromi
Mangan
Molybden

Lipids
Monosaccharides
Amino acids
Small peptides

Bile salts and acids

Sodium
Chloride
Potassium

Short-chain fatty acids

Iron
Vitamin B12
Calcium/vitamin D

Copper
Iodide
Fluoride
Molybdenum

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Roux-en-Y Gastric Bypass (RYGB)

Calcium
Phosphorus
Magnesium
Iron
Copper
Selenium
Thiamin
Riboflavin
Niacin
Biotin
Folate
Vitamins A, D, E, K

Lipids
Monosaccharides
Amino acids
Small peptides

Vitamin C
Folate
Vitamin B12
Vitamin D
Vitamin K
Magnesium
Others*

Water

Vitamin K
Biotin

Esophagus

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Water
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Thiamin
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Niacin
Pantot
Biotin
Folate
Vitamin
Vitamin
Vitamin
Calcium
Phosph
Magnesi
Iron
Zinc
Chromi
Mangan
Molybden

Lipids
Monosaccharides
Amino acids
Small peptides

Bile salts and acids

Sodium
Chloride
Potassium

Short-chain fatty acids

Thiamine
Riboflavin
Niacin
Biotin
Folate
Vitamin B6
Vitamin B12
Vitamin ADEK

Calcium
Iron
Phosphorus
Magnesium
Manganese
Selenium
Copper
Zinc

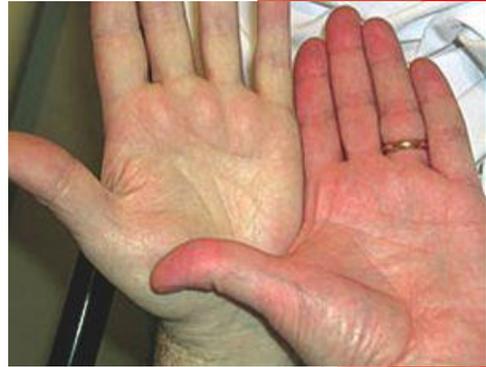
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Skin

- Pallor (hands, eyelid, nail beds, tongue), scaly/dry skin
 - Related to iron and/or B-complex vitamin deficiencies, biotin



Nails

- Koilonychia → Iron deficiency
- Evaluate colour, capillary refill, texture of nails



Pressure is applied to nail bed until it turns white

Blood returned to tissue



Hair

- **Hair Loss** - Shedding vs hair loss (alopecia)

Shedding

- Normal hair cycle
- Emotional/Physical stress
- 0-9 months post-op

Hair Loss (alopecia)

- Protein malnutrition
- Deficiencies: zinc, iron, selenium, biotin, EFA
- Continues >1yr post-op



Hair loss - Recommendations

- **Early post-op (0-9 months)**
 - Provide education re: normal hair growth/loss during weight loss phase
 - Ensure adequate protein intake (1-1.5 g/kg IBW/day)
 - Adequate vitamin/mineral supplements
 - Consider biotin supplements (30 -1000 mcg/day – limited evidence)

Hair loss - Recommendations

- **Late post-op (>1 yr)**
 - Look for s/s of ferritin, zinc and/or protein deficiency
 - Treat deficiencies (if found)
 - Consider adding EFA
 - Ensure adequate nutrition/food intake.

Symptoms of Nutrient Deficiencies after Bariatric Surgery

Nutrient	Symptoms of Deficiency
Vitamin B12	Anemia, neuropathy, cognitive disorders
Folic Acid	Megaloblastic anemia, neurologic symptoms, psychiatric symptoms
Vitamin D/Calcium	Osteopenia/osteoporosis, hypocalcemia, tetany, cramping
Vitamin A	Night blindness, ocular xerosis, altered immunity
Vitamin B1	Confusion, disorientation, polyneuritis, ataxia/gait, nystagmus, n/v, constipation
Iron	IDA/ID, fatigue, generalized weakness, irritability, pica, koilonychia, brittle hair

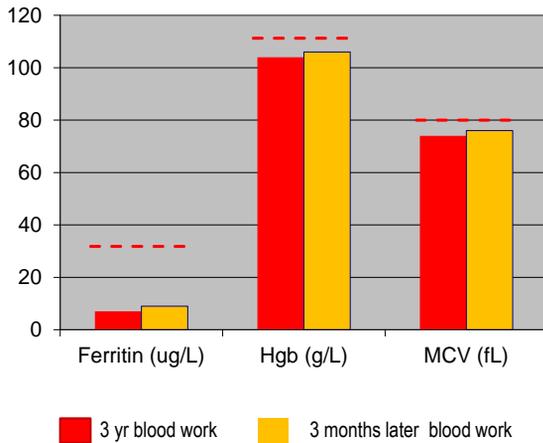
Joan

- 3 years post-RYGB
- c/o: fatigue, weakness, concentration difficulties, dizziness, lack of appetite, hair loss
- Supplements:
 - 2 MVI, ferrous gluconate 300 mg BID, vitamin D, calcium and vitamin B12

Joan

- ~~Lab~~ Tested for iron status
 - Low hemoglobin (104 g/L)
 - Low MCV (74 fL)
 - Low ferritin (7 ug/L)
 - Abnormal LFTs
- IDA
- Recommendations:
 - Ferrous sulfate 300 mg (BID – TID)
 - Vitamin C 250-500 mg
 - Bedtime (avoid calcium w/in 2 hrs of iron)

Joan's Labs – 3 months later



- Ferritin (10 ug/L)
- Hgb (110 g/L)
- MCV (76 fL)

Goals:
 Ferritin >30 ug/L
 Hgb >115 g/L
 MCV >80 fL

Joan

- Referred to hematology (undergoes iron infusions)
- Continues to c/o fatigue, weakness, concentration difficulties, dizziness, lack of appetite, hair loss
- Food intake has declined, taste changes, experiencing diarrhea

Joan – Case Study

- Other micronutrient to consider → **ZINC, COPPER**
- Iron levels not improving, taste changes, hair loss, lack of appetite (SYMPTOMS of zinc deficiency)
- Look at:
 - Multivitamin – copper : zinc ratio (aim for 1mg copper to 7.5-15 mg zinc)
 - How long Joan has had IDA / low iron status (look for trends in blood work)
 - Plasma zinc laboratory values: borderline low levels can have symptoms of deficiency

Joan – Recommendations

- Add zinc supplement (60 mg elemental): 1-2x/day
ONLY SHORT TERM (4-6 weeks)



CAUTION:
Chronic oral zinc
supplementation can cause a
copper deficiency

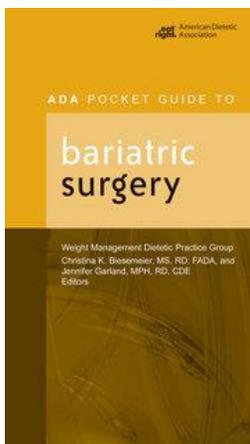
Joan

- 3 months later
- Joan reports improved taste, no diarrhea and better po intake.
- Hair loss, concentration and weakness slowly improving.
- Consider removing zinc supplement and ask Joan to monitor symptoms

Resources: Post-op nutrition complications

Resources – Vitamin/Mineral Deficiencies and/or Treatment

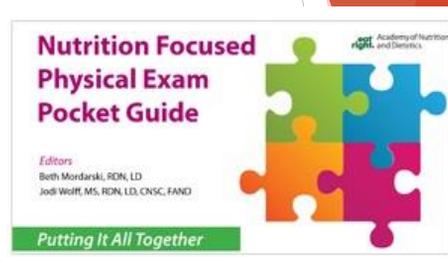
- Isom, K., et al. *Nutr Clin Pract.* 2014;29:718-739.
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- Cummings, S & Isom, K. 2014. *Academy of Nutrition and Dietetics Pocket Guide to Bariatric Surgery, 2nd ed*



2009



2015



2015

Professional Resources

Dietitians of Canada:

DC – Learning on Demand
 DOC Network
[Bariatric surgery subgroup](#)
 PEN – Bariatric Pathway

Academy of Nutrition & Dietetics:

Weight Management Dietetic
 Practice Group www.wmdpg.org

The screenshot displays two views of the 'Learning on Demand' store. The top view is for 'obesity' and the bottom view is for 'bariatric'. Both views feature a left-hand navigation menu with the following categories: My Library, Learning On Demand (sub-categories: Clinical Nutrition, Management, Population Health, Professional Communications), Online Courses, and Quick-Sync Service. The 'obesity' store shows 10 video thumbnails with titles such as 'Secrets of smart snacking', 'Towards 2020: How dietitians can lead the way in the battle against diabetes and obesity', 'Evidence, tradition and passions', 'Physical activity: Finding the right prescription for clients with obesity', 'Obesity and emotional eating: I know what I should eat, so why can't I stay on track?', 'Standing up for those who stand out: Reversing obesity bias', 'Living with Obesity: A Patient's Experience', 'Making peace: Alternatives to the war on obesity', 'A dietitian's survival guide for obesity management', and 'Reducing the Burden of Obesity: A Role for Nutrition Therapy'. The 'bariatric' store shows 3 thumbnails: 'Does bariatric surgery reverse and possibly cure diabetes?', 'Adult bariatric clinical nutrition', and 'Bariatric Surgery Quick-Sync'. At the bottom left, logos for Dietitians of Canada (Les diététistes du Canada) and afhto (Allied Family Health Professionals Network) are visible.

Resources for Providers

www.worldobesity.org

www.asmb.org

www.obesity.org

www.cabsp.ca

www.obesitynetwork.ca

www.ontariobariatricnetwork.com



Bariatric Care:

- eConsult (Amir Afkham: amir.afkham@lhins.on.ca)
 - Bariatric Medicine: Dr. Judy Shiau, MD
 - Bariatric Surgery: Aspen Viets, NP
 - Bariatric Nutrition: Jennifer Brown, MSc., RD

Only available for PCPs



Take Home Messages



Key Messages

Surgical intervention is a TOOL

High risk of nutritional complications

Assess & treat micronutrient deficiencies

Use nutrition focused physical assessment

Stay connected & collaborate



Dietitians of Canada
Les diététistes du Canada
Diabetes, Obesity and Cardiovascular Network



afhto



Dietitians of Canada
Les diététistes du Canada
Ontario Family Health Teams Network

Next Webinar.....Advanced Bariatric Nutrition

- Rare vitamin/mineral deficiencies
- Eating disorders post-op
- Reactive hypoglycemia
- Pregnancy after bariatric surgery
- Special considerations (ESRD, renal transplant, kidney stones)
- Practical case studies



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Thank You Questions?



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