Nutritional Considerations with Obesity and Bariatric Surgery

Presented by Dr. Ron Grabowski
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Two-thirds (190 million) of Americans are overweight or obese.

Childhood obesity has tripled in the last 30 years.

In the United States it is estimated that approximately 8% of the population is in the Class 3 obesity range.

Class 3 obesity is defined as a BMI of greater than 40 kg/m².

Class 3 obesity is associated with premature death and an increased risk for diabetes, hypertension, hypercholesterolemia, heart disease, osteoarthritis, sleep apnea and gallbladder disease.
Obesity is associated with chronic low-grade inflammation.

Moderately elevated CRP concentrations have been associated with obesity.
  - Women > Men

J Clin Invest – 2005
Diabetes Care - 1999
✓ Studies demonstrate that between 25% and 60% reductions in all-cause, cardiovascular, and cancer mortality are associated with significant weight loss.

Am J Epidemiol. 1995
NEJM – 2007
CURRENT TREATMENT RECOMMENDATIONS

- Pharmacologic agents
- Dietary modifications (low-calorie)
- Behavioral modification
- Exercise
- Surgery
✓ Statistics reveal an initial weight loss of less than 15% of the starting weight and weight reductions decrease to zero at the five years.

Ann N Y Acad Sci – 1987
MEDICATION AND_behavioral therapy

✓ Have shown to report an average long-term weight reduction of only 4 to 7 kg.

BMJ – 2001
CMAJ – 1999
Int J Obes Relat Metab Disord. – 1997
Bariatric Surgery

✓ NIH Recommendations
  BMI of greater than 40 kg/m².
  BMI greater than 35 kg/m² with additional serious medical problems.

✓ Types
  Roux-en-Y gastric bypass (RYGBP)
  Laparoscopic adjustable gastric banding

✓ Statistic
  10-fold increase in bariatric surgeries during the past decade.
  AJM – 10/2008
Malabsorption
  – Macronutrient considerations
  – Micronutrient considerations

Diagnostics for Nutritional Status
  – Plasma or Serum
  – Intracellular (Functional)
Increased U.S. Demand for WLS*

Number of operations

Year

'92 '93 '94 '95 '96 '97 '98 '99 '00 '01 '02 '03

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000
NUTRITIONAL DEFICIENCIES FOLLOWING BARIATRIC SURGERY

- Protein
- Iron
- Vitamin B12
- Folate
- Calcium

- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K

Obes Surg. (2/2005)
493 PATIENTS (318—1 yr. follow up & 141—2 yr. Follow up)

Nutrient Deficiencies

✓ Vitamin A deficiency – 11%
✓ Vitamin C – 34.6%
✓ Vitamin D – 7%
✓ Vitamin B1 – 18.3%
✓ Vitamin B2 – 13.6%
✓ Vitamin B6 – 17.6%
✓ Vitamin B12 – 3.6%

Am Surg – Dec 2006
RYGBP Surgery:

- Vitamin B12 – 10-50%
- Iron – 10-50%
- Folic acid – 0-40%
- Vitamin D – 80% (pre and post-surgery)
  - Secondary hyperparathyroidism

Curr Opin Clin Metab Care – 2006
Am Fam Physician - 2003
✓ African American patients had higher number of deficiencies than white patients.
  – 1 year – Vitamins A, D, B1
  – 2 year – Vitamins B1 and B6
✓ Women had higher number of deficiencies than men.
  – 1 year – Vitamin C

Am Surg – Dec 2006
Are we addressing all of the deficiencies or just the most common?
The most common vitamin deficiency associated with obesity.

Deficiency has been associated with increased risk of such diseases as diabetes, cardiovascular disease, depression, osteoporosis and cancers.

Secondary hyperparathyroidism are known to be prevalent in obesity.

Diabetes Care-2004
Arch Intern Med – 2007
Curr Opin Clin Nutr Metab Care – 2007
VITAMIN D DEFICIENCY

- Diabetes mellitus
- Hypertension
- Cardiovascular disease
- Common Cancers
- Infectious diseases
- Autoimmune diseases

AJCN – 4/2008
VITAMIN D LABORATORY VALUES

Deficiency – 25 (OH) D < 50 nmol/L or 20 ng/mL

Insufficiency - 51-74 nmol/L or 21-29 ng/mL.

Sufficient - > 30 ng/mL.

Intestinal calcium absorption is maximized – 80 nmol/L or 32 ng/mL.

Intoxication - > 375 nmol/L or 150 ng/mL.

Deficiency associated with:
  • Depression
  • Stroke
  • Colorectal neoplasia

Alkaline phosphatase (ALP) hydrolyzes pyridoxal-5’-phosphate and is a major determinant of vitamin B6 concentrations.

Elevated concentrations of ALP have also been reported in obese patients.

Curr Opin Clin Nutr Metab Care – 2001
Am J Clin Pathol - 2006
Deficiency associated with:

- All-cause mortality
- Myocardial infarction
- Gallbladder disease

Low plasma levels have been related to a central fat distribution independent of BMI.

Lancet – 2001
Arch Intern Med - 2000

AJCN-2005
Patients with moderately elevated CRP concentrations had significantly lower mean concentrations of vitamin A, B-6, and C than did patients with lower CRP concentrations.
SYSTEMIC INFLAMMATION

Associated with reduced levels of:

- Vitamin A
- Riboflavin (B2)
- Pyridoxine (B6)
- Vitamin C
- Transport proteins (albumin)
- Turnover of antioxidants
Standard Multivitamin supplementation is not sufficient to prevent nutritional deficiencies after RYGBP.

Approximately 60% of patients following RYGBP required one or more nutritional supplements 6 months post surgery and all patients needing them after 2 years.

The prevalence of vitamin D and calcium deficiency increases significantly with the length of the RYGBP.

AJCN – 5/2008
44 year old female
Gastric banding procedure

Chief Complaints:
- Muscle weakness, myalgia, fatigue and allergies

SpectraCell Results: (12/22/06)
- **Deficient:** Glutathione, Oleic acid and fructose sensitivity.
- **Marginal:** B12, Pantothenate, Asparagine, Vitamin D, Calcium, Zinc, Magnesium
46 year old female
Gastric banding procedure
Chief Complaints:
  – Alopecia, fatigue and muscle cramps
SpectraCell Results: 11/04/2009
  – **Deficient**: B2, Asparagine, Oleic acid, Vitamin K2 and Spectrox – 65%.
  – **Marginal**: Biotin and Chromium
CASE STUDY #3

45 year old female  
RYGBP – 2000

Chief Complaints:
Fatigue, muscle spasms and headaches.

PMHx: Hypothyroidism, Depression, Fibromyalgia.

Medications: Zyrtec, Levoxyl, Ambien, Cymbalta, Wellbutrin, Klonopin, Lovaza

SpectraCell: 12/22/2009

- Deficient: Vitamin D, Vitamin E, Vitamin K2 and Spectrox- 48.0%.
- Marginal: B6, Serine, Pantothenate, Fructose, Cysteine and Vitamin C.
Thank you for attending the webinar.
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