Overview

- Definition
- Obesity as a Risk Factor
- Benefits of Weight Loss
- Evaluation of the Obese Patient
- Obesity Management
  - Diet
  - Exercise
  - Drugs
  - Surgery

Obesity: Definition

- Body Mass Index (BMI): Weight (kg) / Height² (m²)
- Overweight: BMI 25.0 – 29.9
- Obesity: BMI > 30.0
  - Class I: BMI 30.0 – 34.9
  - Class II: BMI 35.0 – 39.9
  - Class III: BMI > 40

Prevalence of Obesity is Rising

National Center for Health Statistics
nchspressroom.wordpress.com

Obesity as a Risk Factor

- Coronary Artery Disease
- Type 2 Diabetes
- Hypertension
- Stroke
- Hyperlipidemia
- Venous Insufficiency
- Osteoarthritis
- Steatohepatitis
- Cholelithiasis
- Sleep Apnea
- Cancer
- Others
Health Risks of Obesity

- Increase even within range of overweight
- BMI 30 confers 2-4 fold risk of HTN, CAD
- Woman, BMI 35 has 90-fold risk of T2DM

Willet WC NEJM 1999
Chan Diabetes Care 1994

Evidence for Weight Loss Benefits

If being overweight is bad for you, is losing weight good for you?

- Strong benefit for glycemic control
- Reduction in BP
- Increase in HDL, reduction in TG
- ~20% weight loss needed for reduction in LDL
- Improvement in OSA
- Improvement in CRP
- Improvement in QOL

Look AHEAD: 1 year data

<table>
<thead>
<tr>
<th>LI</th>
<th>DL</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>%</td>
<td>(% weight loss)</td>
<td>weight loss loss</td>
</tr>
<tr>
<td>A1c (%)</td>
<td>-0.64</td>
<td>-0</td>
</tr>
<tr>
<td>Glucose (mg/dl)</td>
<td>-21.5</td>
<td>-7.2</td>
</tr>
<tr>
<td>% on diabetes medications</td>
<td>-7.8</td>
<td>+2.2</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>-6.8</td>
<td>-2.8</td>
</tr>
<tr>
<td>Diastolic BP (mmHg)</td>
<td>-3.0</td>
<td>-1.8</td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td>-5.2</td>
<td>-5.7</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>+3.4</td>
<td>+1.4</td>
</tr>
<tr>
<td>TG (mg/dl)</td>
<td>-30.3</td>
<td>-14.6</td>
</tr>
</tbody>
</table>

Look AHEAD Research Group Diabetes Care 2007

Look AHEAD 4 year data

-6.15% vs. -0.88%
-5.33% vs. -2.97%

Look AHEAD Research Group Diabetes Care 2010
Diabetes Prevention Program

- Reduction in progression from IGT to T2DM

<table>
<thead>
<tr>
<th>Diet + Exercise</th>
<th>Metformin</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>58% Reduction (4.8 vs. 11%/yr)</td>
<td>31% Reduction (7.8 vs. 11%/yr)</td>
<td>11</td>
</tr>
</tbody>
</table>

6.7% Weight Loss

DPP Research Group. NEJM 2002

Weight Loss Benefits: Note

There are minimal data on longer-term health outcomes of death and cardiovascular disease after weight loss.

Evaluation of the Obese Patient

Screen all adult patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults.

Grade: B Recommendation

USPSTF Guidelines

- Grade: I Statement.

HEDIS measure since 2009: Documentation of BMI in medical record and counseling on nutrition and physical activity.

Undiagnosed, unmanaged

- 2500 patients with BMI >30 at Mayo Clinic
- Diagnosis made/recorded: only 25%
- Documenting significantly increased counseling

The Office Visit

- Comprehensive history, exam, labs
- Measure weight, height, WC, record BMI
- Categorize obesity and assess risk
  - Central obesity, co-morbidities
- Assess need for treatment
- Broach the subject
  - Tell your patient her BMI
- Assess readiness for treatment
  - Previous weight loss attempts, motivation, stresses/barriers, psychiatric illnesses, time

The Practical Guide 2000

Treatment: Therapeutic Tools

- Diet
- Behavior modification
- Physical activity
- Medications
- Surgery

Indications for Weight Loss Therapy

<table>
<thead>
<tr>
<th>BMI</th>
<th>Diet and Exercise</th>
<th>Pharmacotherapy</th>
<th>Surgery</th>
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</thead>
<tbody>
<tr>
<td>≥ 25</td>
<td>Prevention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 25 + comorbidity</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 27 + comorbidity</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>≥ 30</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>≥ 35 + comorbidity</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>≥ 40</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Obesity is an Energy Balance Disorder

Expenditure < Intake

Obesity is an Energy Balance Disorder

Dietary Composition

- 6 months: 6 kg (7%) weight loss
- 2 years: 3-4 kg weight loss
- Irrespective of macronutrient composition

NHLBI Obesity Clinical Guideline 2000

Sacks FM NEJM 2009

Diet

- Goal/Expectation: Loss of 10% in 6 months
- BMI 27 - 35:
  - Deficit 300-500 kcal/day = ½ - 1 lb / week loss
- BMI > 35
  - Deficit 500-1,000 kcal/day = 1-2 lb / week loss
- 22 cal/kg (± 20%) needed to maintain
- Calorie prescription:
  - \([22 \times \text{Wt (kg)}] – [500-1000]\)
Diet Bottom Line:
It’s about calorie restriction, not dietary composition

Evidenced Based Strategies for Lifestyle Change

- Calorie and portion controlled foods
- Frequent follow up visits
- Self monitoring
  - Weight, diet, physical activity
- Physical activity
- Referral to commercial program (Weight Watchers)

Meal Replacements

- Frozen diet meals
- Liquid meals
- Bars
- Portion controlled
- Calorie controlled
- Convenient
- Inexpensive
- As part of a sensible well planned menu

Frequent Follow Up Visits

- Number of sessions attended (Look AHEAD)
- Self-Monitoring
  - Weight loss at 1 year in lowest and highest thirds of adherence to completing food intakes

Weight Watchers

- RCT: Weight Watchers referral vs standard care
- Followed for 1 year
- Mean weight change: -5 versus -2.25 kg

Exercise

- Any activity that uses one or more large muscle groups and raises the heart rate
- Low fitness is an independent predictor of mortality for any BMI
- Exercise alone: limited effect on weight loss
- Addition of exercise to diet: augmented weight loss by 1.1 - 1.5 kg
- Weight Maintenance: 60-90 minutes moderate intensity daily helps with longer term weight loss maintenance

Shaw K Cochrane 2006; Saris WH Obes Rev 2003
**Treatment: Therapeutic Tools**
- Diet
- Behavior modification
- Physical activity
- Medications
- Surgery

**Weight Loss Medications**
- Indications:
  - BMI >30; BMI >27 with co-morbidities
  - Use as adjunct to diet and exercise
  - Not recommended for use in combination
  - Augment weight loss about 5% (2-5 kg) beyond diet and exercise
  - Phentermine: appetite suppressant
  - Orlistat: lipase inhibitor

**Bariatric Surgery: Indications**
- Roux-en-Y, Gastric Sleeve: BMI >40; >35 with co-morbidities
- LAGB: BMI >30; >35 with co-morbidities

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Absolute Weight Loss (kg)</th>
<th>Initial Weight Loss (%)</th>
<th>Excess Weight Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastric Band</td>
<td>28.64</td>
<td>47.4</td>
<td></td>
</tr>
<tr>
<td>Gastric Bypass</td>
<td>43.48</td>
<td>34.9</td>
<td>61.6</td>
</tr>
</tbody>
</table>

**Efficacy of Bariatric Surgery**

**Surgical Weight Loss is Sustained**

**Improvement of CVD Risk Factors by Bariatric Surgery**
Surgery for Treatment of DM
- RCT: Med, RYGB, Bilio-Pancreatic Diversion
  - 60 subjects
- Remission (FBG<100; A1c <6.5%): 0 vs 75 vs 95%

Complications of LAGB
- Reoperation
- Band Intolerance
- Band Slippage
- Port problems
- Band Erosion
- Damage To Adjacent Abdominal Organs
- Death (within 30 days) <0.5%

Complications of RYGB
- Anastomotic leaks
- Small Bowel Obstruction
- Outlet Obstruction
- Herniation
- Organ Damage
- Bleeding
- Wound Infections
- DVT/Pulmonary Embolus
- Malnutrition
- Death (within 30 days) (<0.5%)

Post-surgical management
- LABG: No malabsorption, only restriction
- RYGB
  - Sufficient protein intake (60-120 g/d)
  - Multivitamin supplementation
  - Periodic screening for nutritional deficiencies
    - Fe, B12, Folate, Ca, 25OHD, albumin/prealbumin
  - Bone health
    - Ca, PO4, PTH, 25OHD, bone mineral density
    - Calcium and 25OHD supplementation

Summary: Obesity
- Defined as BMI > 30 kg/m²
- Risk Factor for multiple co-morbidities
- Weight loss of 5-10% confers significant metabolic benefit
- Obesity management options include
  - Diet
  - Exercise
  - Drugs
  - Surgery

Board Question 1
A 37 year old woman presents to your office to discuss whether she would be a candidate for bariatric surgery, which her sister recently had. Her blood pressure is 122/76 mm Hg, her pulse is 82, body mass index is 36 kg/m². Her medical problems include hypothyroidism, type 2 diabetes and obstructive sleep apnea. After counseling about lifestyle changes and recommending a diet and exercise program, you inform her that if this fails to produce goal weight loss, she would be eligible for:
  A. Laparoscopic adjustable band but not gastric bypass
  B. Laparoscopic adjustable band and gastric bypass
  C. Neither band nor gastric bypass
  D. Sibutramine therapy
**Answer 1**

**B. Laparoscopic adjustable band and gastric bypass**

- The indications for bariatric surgical procedures are:
  - Roux-en-Y: BMI >40; >35 with co-morbidities
  - LAGB: BMI >35; >30 with co-morbidities

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**Board Question 2**

A 56 year-old man with recent fasting blood glucose levels in the range of 105-115 mg/dl and a hemoglobin A1c of 6.2% is concerned about developing diabetes, as his father recently had a below-the-knee amputation which he has been told is a consequence of poorly controlled diabetes. He asks what you would recommend as the most effective strategy to prevent progression to diabetes.

A. You inform him he already has diabetes
B. You recommend a diet and exercise plan with goal weight loss of 5-10%
C. You recommend decreasing dietary carbohydrate content
D. You recommend treatment with an oral hypoglycemic agent such as a sulfonylurea or a thiazolidinedione

**Answer 2**

**B. You recommend a diet and exercise plan with goal weight loss of 5-10%**

![Graph showing weight loss comparison between Diet + Exercise, Metformin, and Placebo]

- 58% Reduction (4.8 vs. 11%/yr)
- 31% Reduction (7.8 vs. 11%/yr)
- 6.7% Weight Loss

**References**