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SURGERY FOR METABOLIC SYNDROME
Dietary Trends

Aw, nuts!

Two and a half feet wide

http://umsl.edu/~nki4z3
Lifestyle to Obesity
OBESITY

- Body Mass Index
  - i.e. B.M.I. Is weight in kilograms divided by height in metres squared.
  - B.M.I. > 30 kg/m² is Obesity
  - B.M.I. > 35 is Morbid Obesity
  - 17 % of U.K. Population is Obese.
  - 2 % of U.K. Population is Morbidly Obese.
OPTIONS

- Untreated, an obese person has only a 1 in 7 chance of reaching Normal life Expectancy.
- Most obese patients are treated conservatively with:
  - Lifestyle advice
  - Dietary advice
  - Drugs
- Morbid obesity, however, requires surgery.
Obesity and related co-morbidities

- Blood pressure
- Hypertension
- Stroke
- CV
- T2D
- Retinopathy
- Neuropathy
- Nephropathy
- Obstructive Sleep Apnoea
- Musculo-skeletal problems

### The estimated increased risk of developing obesity-associated diseases

<table>
<thead>
<tr>
<th>Disease</th>
<th>Relative risk</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td><strong>Women</strong></td>
<td><strong>Men</strong></td>
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<tr>
<td>Type 2 diabetes</td>
<td>12.7</td>
<td>5.2</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4.2</td>
<td>2.6</td>
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<tr>
<td>Myocardial infarction</td>
<td>3.2</td>
<td>1.5</td>
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<tr>
<td>Colon cancer</td>
<td>2.7</td>
<td>3.0</td>
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<tr>
<td>Angina</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Gall bladder disease</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>1.7</td>
<td>--</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>1.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.3</td>
<td>1.3</td>
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</tbody>
</table>

The obesity epidemic

- In Europe, there will be 150 million obese adults by 2010 [1]
- 9,000 premature deaths a year in the UK are related to obesity [2]
  - In the 25 years up to 2004, the prevalence of obesity in the UK increased 400% [3]
- There are now more obese than overweight people in the USA [4]
  - >34% obese, compared to 32.7% who are overweight
- Between the National Health and Nutrition Examination Survey (NHANES) II and III, obesity rose from 14.5% to 22.5% [5]

Weight is controlled by a complex feedback mechanism

Metabolic syndrome

- Definition:
  - Insulin resistance/impaired glucose tolerance (Fasting glucose > 5.6 mmol/L)
  - BP >130/80
  - Raised Triglycerides (>1.7 mmol/L)
  - Low HDL (< 0.9 men, < 1.0 mmol/L women)
  - Central Obesity (waist >102 cm men, 88 cm women)
What does Metabolic Syndrome mean to patient?

- Increased risk of diabetes (quantify)
- Increased risk of cardiovascular disease (angina, CVA, MI, intermittent claudication)
Medical Treatment of Metabolic Syndrome

- Simvastatin 40mg (or equivalent)
- Aim for total Cholesterol < 5.0 mmol/L (if high risk of CVD – target = 4.0 mmol/L or less)
- Blood pressure – medication (e.g. ACE inhibitor) target < 130/80 mmHg
- If diabetic – metformin first line
What should we do about it?

- Metabolic syndrome (insulin resistance, IGF)
  - Lose weight
    - Diet (Weight reducing and sugar free)
    - Exercise
    - Drugs (Orlistat)
    - Surgery
  - Address other risk factors for CVD
    - Hypertension BP<130/80
    - Lipids: Simvastatin 40mg or equivalent
    - Stop smoking
- Treat as if diabetes
Surgical treatment of the Metabolic Syndrome


- Diabetes
  - Resolved 76.8%
  - Improved 86.0%

- Hyperlipidaemia
  - Improved 70.0%

- Hypertension
  - Resolved 61.7%
  - Improved 78.5%

- Obstructive sleep apnoea
  - Improved 85%
# The benefits of 10% weight loss

<table>
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<tr>
<th>Mortality risk</th>
<th>Total mortality</th>
<th>Reductions</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>&gt;20%</td>
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<tr>
<td>Diabetes-related deaths</td>
<td></td>
<td>&gt;30%</td>
</tr>
<tr>
<td>Obesity-related cancers</td>
<td></td>
<td>&gt;40%</td>
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<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic</td>
<td></td>
<td>10 mmHg</td>
</tr>
<tr>
<td>Diastolic</td>
<td></td>
<td>20 mmHg</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fasting glucose</td>
<td></td>
<td>30–50%</td>
</tr>
<tr>
<td>Risk of developing diabetes</td>
<td></td>
<td>50%</td>
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<tr>
<td>HbA$_{1c}$</td>
<td></td>
<td>15%</td>
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<tr>
<td>Lipids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol</td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>LDL-cholesterol</td>
<td></td>
<td>15%</td>
</tr>
<tr>
<td>Triglycerides</td>
<td></td>
<td>30%</td>
</tr>
</tbody>
</table>

Pharmacologic obesity therapy has provided limited results

- May not sustain long-term weight loss in most patients [1–3]
  - Efficacy beyond 2 and 4 years is not established in clinical trials [1,3]
  - Only a minority of patients lose ≥10% of their weight [1,3]
- Appetite is not the only factor associated with obesity
  - Powerful forces drive eating
  - People may eat for comfort
  - Genetics and faulty metabolism

Bariatric Surgery

- Bariatric – Greek word
  - Bar = weight
  - Iatro = treatment

- Goal of treatment:
  Improve or resolve co-morbid conditions and to improve the quality of life by restoring metabolic and organ functions.
Eligibility Criteria For Surgery

- BMI > 40 or BMI > 35 with obesity related co-morbidity.
- Age 16 – 65 years.
- Acceptable medical / operative risks.
- Failed conservative treatment.
- Obese for a minimum of 5 years.
- Commitment to life – style changes.
Ineligibility Criteria

▪ Unsolved history of Alcohol / Drug Abuse.
▪ History of major Psychiatric illnesses.
▪ Hostile Unco-operative behaviour.
▪ Un-realistic expectations.
▪ Un-acceptable Medical risks.
Consider surgery for obese patients where:

- BMI > 40 kg/m²
- BMI 35–40 kg/m² with other significant disease (e.g. T2D, high blood pressure) that could be improved with weight loss
- All appropriate non-surgical measures have failed to achieve or maintain weight loss for at least 6 months
- They are receiving or will receive intensive specialist management
- They are generally fit for anaesthesia and surgery
- They commit to the need for long-term follow-up

Surgery is a first-line option for patients with a BMI > 50 kg/m² in whom surgical intervention is considered appropriate

Bariatric Procedures

1. Restrictive.
2. Malabsorptive.
3. Combination of 1 & 2.

- Restrictive operations involve reducing capacity for food intake.
- Malabsorptive procedures involve re-arranging small bowel to decrease the functional length or efficiency for nutrient absorption.
Restrictive Procedures

- Jaw wiring
- Intra Gastric Balloon
- Lap Adjustable Gastric Banding
- Gastroplasties
  - Horizontal
  - Vertical
    - Vertical Banded Gastroplasty
- Laparoscopic Vertical Banded Gastroplasty
- Sleeve gastrectomy
Malabsorptive Procedures

- Jejuno ileal bypass
- Gastric bypass
- Bilio-pancreatic bypass
- Duodenal Switch
Jaw Wiring

- Sounds inhumane.
- Patient often breaks wiring.
- Eats / Drinks liquidated Mars Bars.
- Rebound weight gain as soon as wiring is removed.
Gastric Balloon

- Not permanent.
- Deflation of balloon may occur.
- Obstruction.
- Contra – indicated in with previous abdominal surgery.
Gastric Banding

- Prosthetic band is encircled around the proximal stomach and compartmentalized into a small pouch and a large remnant.
- Adjustable gastric banding – by using saline injectable gastric band with reservoir buried subcutaneously.
- Laparoscopically.
- Can be done as a day case surgery
Lap adjustable band

- A silicon band attached to a subcutaneous port is placed around the proximal stomach [1]
- Injection of isotonic fluids into the port hydraulically inflates the band [1]
- Advantages [2]
  - Relatively minor surgery
  - Reversible and adjustable
  - Low operative complication rate
  - Lower risk of gallstones
  - Return to work 1 week after surgery
- Disadvantages
  - Requires an implanted medical device
  - Easier to ‘cheat’
  - Risk of prolapse or slippage
Sleeve gastrectomy
Gastroplasties

Horizontal (now obsolete).

Open Surgery

Vertical

Laparoscopic
Types of surgery
J-I Bypass
Jejuno Ileal Bypass

- Proximal Jejunum anastomosed to distal Ileum (14/4).
- Very successful weight loss.
- Complications:
  - Severe metabolic and Electrolyte disturbance.
  - Vitamin Deficiencies
  - Intractable Diarrhoea
  - Cholelithiasis
  - Urolithiasis
  - Liver Failure
  - Arthritis
- Nearly 30% pts require reversal to treat complications
- Procedure abandoned
Biliopancreatic Diversion & Duodenal Switch
B-P Diversion & Duodenal Switch

- Biliary and pancreatic secretions diverted to distal 50cm of ileum.
- Recommended for Supermorbid
- Protein calorie malnutrition
- Metabolic bone disease
- Fat soluble vitamins deficiency
- Iron calcium and B12 deficiency
Gastric Bypass
Types of surgery

Roux-en-Y Type of Gastric Bypass Procedure

- Esophagus
- New Stomach Pouch
- Diaphragm
- Staples
- Bypassed Part of Stomach

Flow of Food

Unused Portion of the Small Intestine

Small Intestine

Roux-en-Y Gastric Bypass

- Esophagus
- Bypassed Portion of Stomach
- Proximal Pouch of Stomach
- "Short" Intestinal Roux Limb
- Pylorus
- Duodenum
Laparoscopic Gastric Bypass

- Upper Stomach stapled across (pouch of 50 ml)
- Gastro-enterostomy with a Roux limb of 100-150 cms
- Weight loss achieved due to:
  - Gastric Restriction
  - Nutrient malabsorption
  - “Dumping” syndrome- hence patient avoids “sweet” foods.
Gastric Bypass Complications

- **Early**
  - Leak
  - Acute gastric dilatation
  - Roux – Y Obstruction
  - Wound infection/Seroma

- **Late**
  - Stomal stenosis
  - Anemia
  - Vit B12 Deficiency
  - Calcium Deficiency/ Osteoporosis
  - Disruption of staple line
Making the surgical choice: banding versus bypass

Gastric banding
- Minimally invasive and reversible
- Less effective in the long term
- Risk of slippage or erosion
- Associated with a significantly lower risk of serious complications and mortality than bypass
- Possible to ‘cheat’ by eating high sugar foods

Gastric bypass surgery
- Irreversible surgery (?)
- Rapid weight loss
- Requires careful follow up to manage nutritional deficiencies
  - Inadequate follow up may result in osteoporosis, anaemia and blood clotting problems
- Discourages sweet eating due to ‘dumping’ syndrome
Pre-operative Evaluation

- Patients selection for obesity surgery
  - Motivation
  - Absence of Psychosis or Substance abuse
  - Understanding and acceptance
  - Willingness to actively participate
Obesity Management

- Surgeon and General Practitioners
- Gastroentrologist/Endocrinologist
- Dietician
- Radiologist
- Anesthesiologist
Post-Operative Management

▪ Prior to discharge
  ▫ Gastrografin swallow
  ▫ Oral fluids

▪ Post Op Diet
  ▫ First four weeks-Liquid diet
  ▫ Four to six weeks-Slushy food
  ▫ After six weeks solid food
Post Op follow up

- Surgeons
- Dietician
- ?? Psychologist
- Exercise program
Complications

▪ “Rapid pulse”
  (Pulse rate of more than 120 beats per minute)
  ▫ Due to
    Acute gastric dilatation
    Acute afferent loop syndrome
    Peritonitis
OBESITY SURGERY AND DIABETES

- 82 Type II Diabetic patients identified b/w August 1995 till March 2009.
PRE-OP WEIGHT

Histogram

Mean = 153.17
Std. Dev. = 32.414
N = 82
PRE-OP BMI

Mean = 54.48
Std. Dev. = 9.38
N = 72
<table>
<thead>
<tr>
<th></th>
<th>Pre op BMI</th>
<th>BMI at 1\textsuperscript{st} FUp</th>
<th>BMI at 2\textsuperscript{nd} FUp</th>
<th>BMI at 3\textsuperscript{rd} FUp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (Min – Max)</td>
<td>54.8 (37.1–79)</td>
<td>45.26 (32 – 67)</td>
<td>41.9 (28 – 57)</td>
<td>37.3 (27 – 57)</td>
</tr>
<tr>
<td>SD</td>
<td>9.3</td>
<td>7.95</td>
<td>7.7</td>
<td>7.4</td>
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</tbody>
</table>
DIABETES RESOLUTION
INCIDENCE OF SYMPTOMATIC GALLSTONES


- Questionnaire sent out to 240 patients selected from Bariatric data base.
INCIDENCE OF SYMPTOMATIC GALLSTONES

- 190 completed questionnaire received
- 84% Female and 16% Male
- Average age 47 range from 24 – 69
- Time since obesity surgery 1 year – 14 years
- Weight lost range from 6kgs – 152 kgs
  Average weight lost 53 kgs.

- Only 13% had developed gall stones however only 7% required cholecystectomy following gastric bypass surgery.
Questions Please

Why Fat People Should Never Bungee Jump:

Doc's Ever-Changing Home Page
Humor, Jokes, & Fun!
REFERENCES


