Bariatric Surgery for the Treatment of Diabetes

JORGE ACOSTA M.D. FACS

Rio Grande Surgeons PA

Dr. Jorge Acosta

- **Las Palmas Del Sol Bariatric Center Medical Director**
- **Designated Center of Excellence Surgeon**
- **Minimally Invasive Surgery Fellowship**

  University of Louisville

  July 2003 – July 2004
- **Board Certified by the American College of Surgeons**
- **Associate of Rio Grande Surgeons, PA**

Bariatric Accreditations

- HealthGrades 5 Star Recipient for Bariatric Surgery
- American College of Surgeons – Center of Excellence
- ASMBS – Center of Excellence
- BCBS – Blue Distinction
- AETNA – Institutes of Quality
- OptumHealth – Center of Excellence Network
- CIGNA – Certified Hospital for Bariatric Surgery

Experience and Procedures Offered

- Experience
  - Del Sol Medical Center, Dr. Acosta and Dr. Lara have participated in over 2,300 bariatric cases since 2004.
- Surgical Procedures
  - Roux-en-Y Gastric Bypass
  - Sleeve Gastrectomy
  - Adjustable Gastric Band

Obesity

- ASMBS reports that >60 million U.S. adults or > 20% of the U.S. population are obese
- 50% of the U.S. population is overweight
- Greater than 13 million Americans are morbidly obese
- Most studies show a nearly 100% failure rate during a 5 yr. period for persons who diet. In contrast 75% of pts. who undergo LRNYGB are able to keep off at least 50% of their excess wt. for 10 yrs. or longer. (*MacLean LD. Ann Surg. 2000;231*)

COST OF OBESITY

- 2008 - $47 Billion of total medical costs were for treating obesity and obesity related co-morbid conditions

- 10% of U.S. annual medical costs are due to obesity

- 80% greater prescription drug costs for obese pts. when compared to normal weight individuals

Obesity is Associated with Higher Mortality Rates

The New England
Journal of Medicine

VOLUME 341 OCTOBER 7, 1999 NUMBER 15

BODY-MASS INDEX AND MORTALITY IN A PROSPECTIVE COHORT OF U.S. ADULTS

EUGENIA E. CALLE, PH.D., MICHAEL J. THUN, M.D., JENNIFER M. PETRELLI, M.P.H., CARMEN RODRIGUEZ, M.D., M.P.H., AND CLARK W. HEATH, JR., M.D.

ABSTRACT

Background Body-mass index (the weight in kilograms divided by the square of the height in meters) is known to be associated with overall mortality. We investigated the effects of age, race, sex, smoking status, and history of disease on the relation between body-mass index and mortality.

Methods In a prospective study of more than 1 million adults in the United States (457,785 men and 588,369 women), 201,622 deaths occurred during 14 years of follow-up. We examined the relation between body-mass index and the risk of death from all causes [illegible]

THE relation between body weight and mortality remains controversial. Important unresolved questions concern the shape of the curve relating the two variables; the optimal weight for longevity; whether the optimal weight varies according to age, race, or sex; and whether the increased death rates often observed among very lean people are causal or an artifact of leanness due to smoking or concurrent illness. Debate about the potential hazards of excessive leanness has received disproportionate attention in a culture in which obesity is far more prevalen

Complications from obesity result in approximately 300,000 deaths per year in the U.S.

Calle et al, N Eng J Med, 1999; (15)341:1097-105

Morbidity and Mortality

Most of the morbidity and mortality stems from obesity related co-morbid conditions

(Statistics related to Overweight & Obesity NIDDK of the National Institutes of Health)

Medical Complications of Obesity

- ***Diabetes type 2***
- ***Hypertension***
- ***Sleep Apnea***
- Lipid disorders
- Heart disease
- Asthma
- Gallstones
- NASH (non-alcoholic steatohepatitis)
- Urinary incontinence
- Gastroesophageal reflux
- Osteoarthritis

- Infertility and menstrual problems
- Hip, knee, ankle and low back pain
- DVT & thromboembolism
- Psychosocial impairments
- Immobility
- Cancer (breast, colorectal, prostate, endometrial, etc.)
- Venous/stasis ulcers
- Skin infections
- Accident proneness

Body mass Index (BMI)

- BMI= $\frac{\text{weight (kg)}}{\text{height (m) X height (m)}}$

  - Web site to calculate BMI: *www.obesityhelp.com*

SURGERY CRITERIA

National Institutes of Health

BMI 35-40

with significant co-morbid conditions*

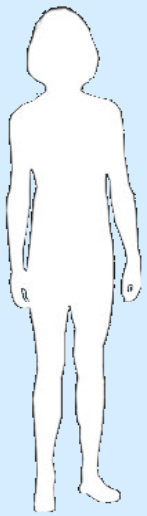
(DM 2, HTN and or OSA)

BMI > 40

Gundersen Lutheran
NUTRITION SERVICES

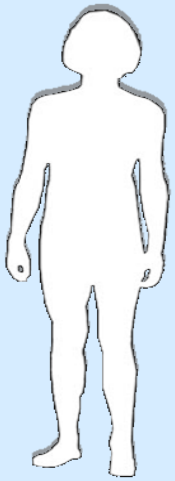
Degrees of Obesity

BMI 18.5 – 24



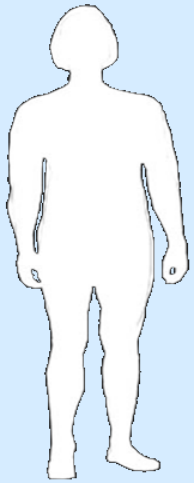
OVERWEIGHT

BMI 25 – 29.



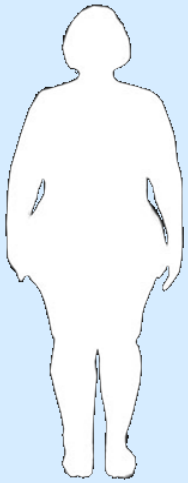
OBESE

BMI 30 – 34.9



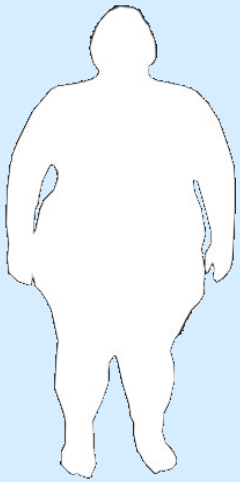
SEVERE OBESE

BMI 35 – 39.9



MORBIDLY OBESE

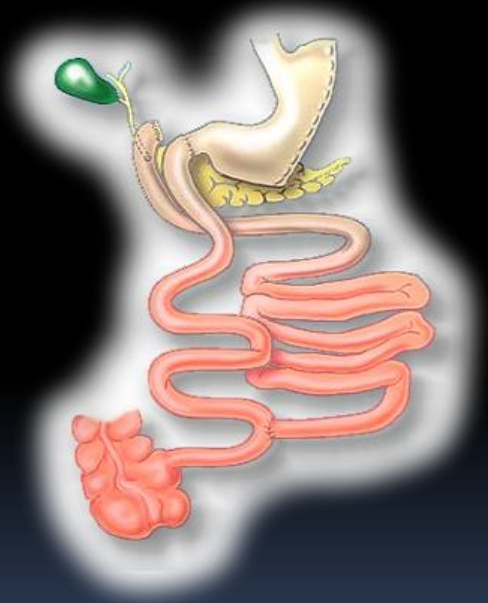
BMI ≥ 40



What is Bariatric Surgery Today?

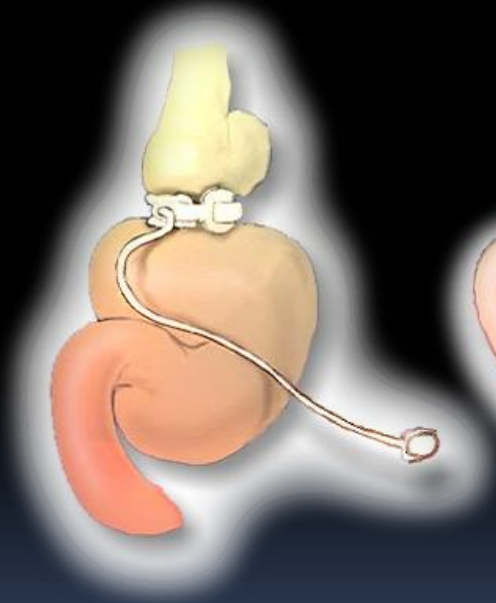
Three Types of Most Commonly Performed Bariatric Surgery Procedures

Malabsorptive



Biliopancreatic Diversion w/ Duodenal Switch

Restrictive



Adjustable Band Gastroplasty

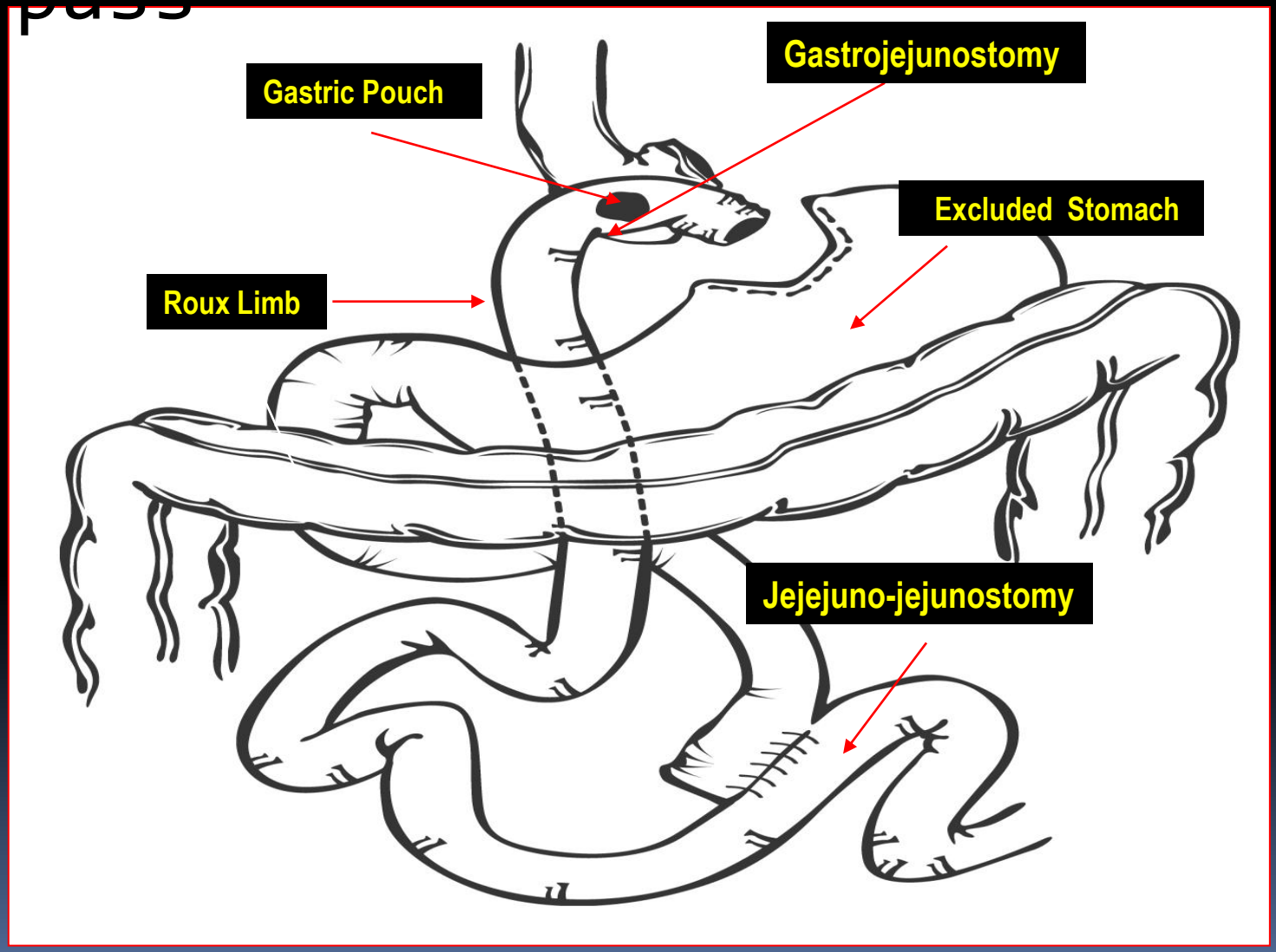
Combination

Roux en Y Gastric Bypass

Laparoscopic vs. Open Surgery

- Laparoscopic Surgery
  - Surgeon uses long instruments to handle organs via monitor
  - Smaller incisions
  - Improved cosmesis
  - Less pain
  - Quicker time to ambulation
  - Decreased pulmonary complications
  - Faster recovery
- Open surgery
  - Surgeon handles the organs
  - Traditional
  - Larger incision

Roux-en-Y


Gastrojejunostomy
Gastric Pouch
Excluded Stomach
Roux Limb
Jejejuno-jejunostomy

Roux-en-Y Gastric Bypass Animation

Bypass Complications

	National Rates	Acosta/Lara
Leak	6%	0.4%
DVT/PE	11%	0.5%
G-J stricture	20%	0.3%
Bowel Obstruction	14%	1.1%
Internal Hernia	5%	0.2%
Stoma Ulcer	16%	0%
Cholelithiasis	38%	5%
Mortality	<1%	0.13%

Dumping Syndrome

- Caused by consumption of concentrated sweets
- Symptoms include: painful cramping, nausea, diarrhea, diaphoresis
- A "desirable side effect" associated with the RNYGB

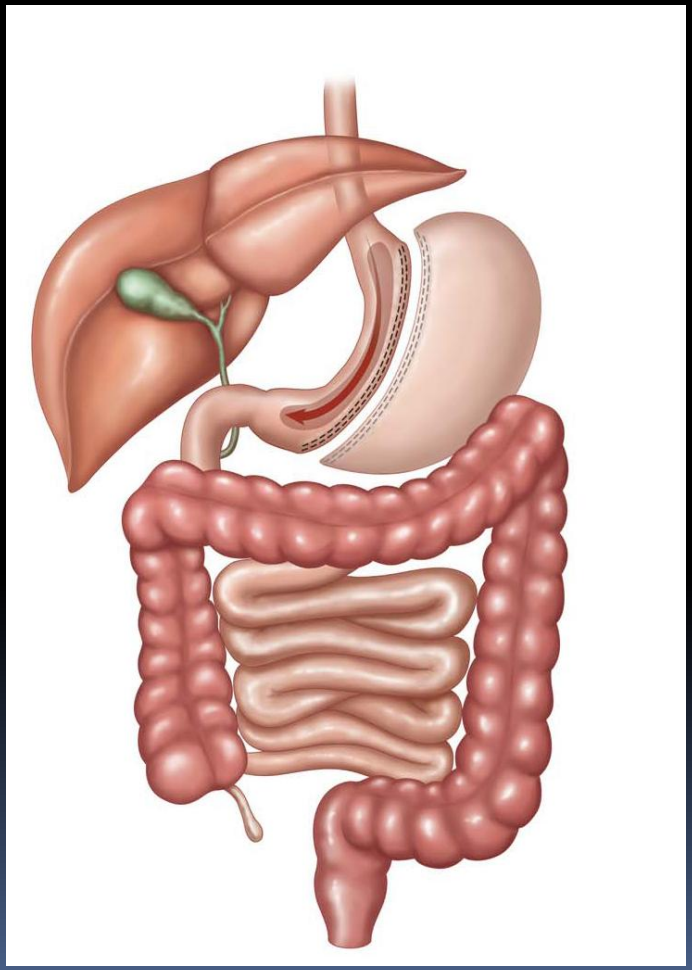
Ghrelin

- Hormone produced by P/D1 cells in stomach (fundus), pancreas, and hypothalamus. This "*Hunger Hormone"* mimics growth hormone, thus increasing food intake and increasing fat mass
- *1 study has found that RNYGB can decrease Ghrelin levels (2002/NEJM 346(21) p. 1623-30) "Plasma Ghrelin levels after diet-induced weight loss or gastric bypass surgery". Cumming D. Weigle D,Frayo R, Breen P.*
- *Research on anti-obesity vaccine, directed Ghrelin using specific antibodies thus preventing Ghrelin from reaching the CNS*

Gastric Bypass Follow-Up

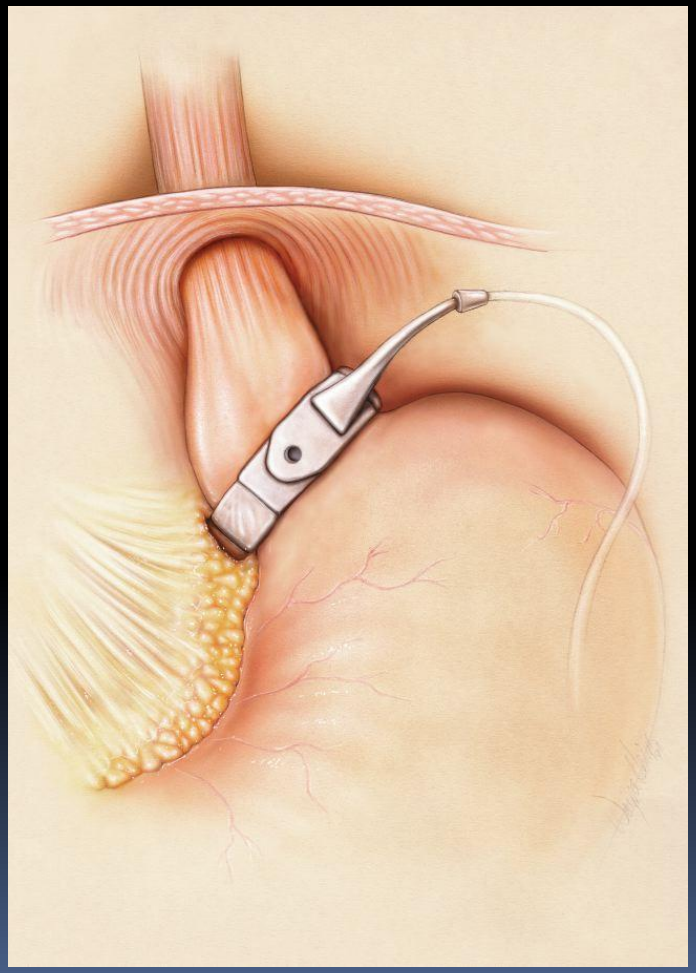
- 2 weeks
- 3 months
- 6 months
- 12 months
- 18 months
- Annually thereafter

Vertical Sleeve Gastrectomy



Vertical Sleeve Gastrectomy

Adjustable Gastric Band

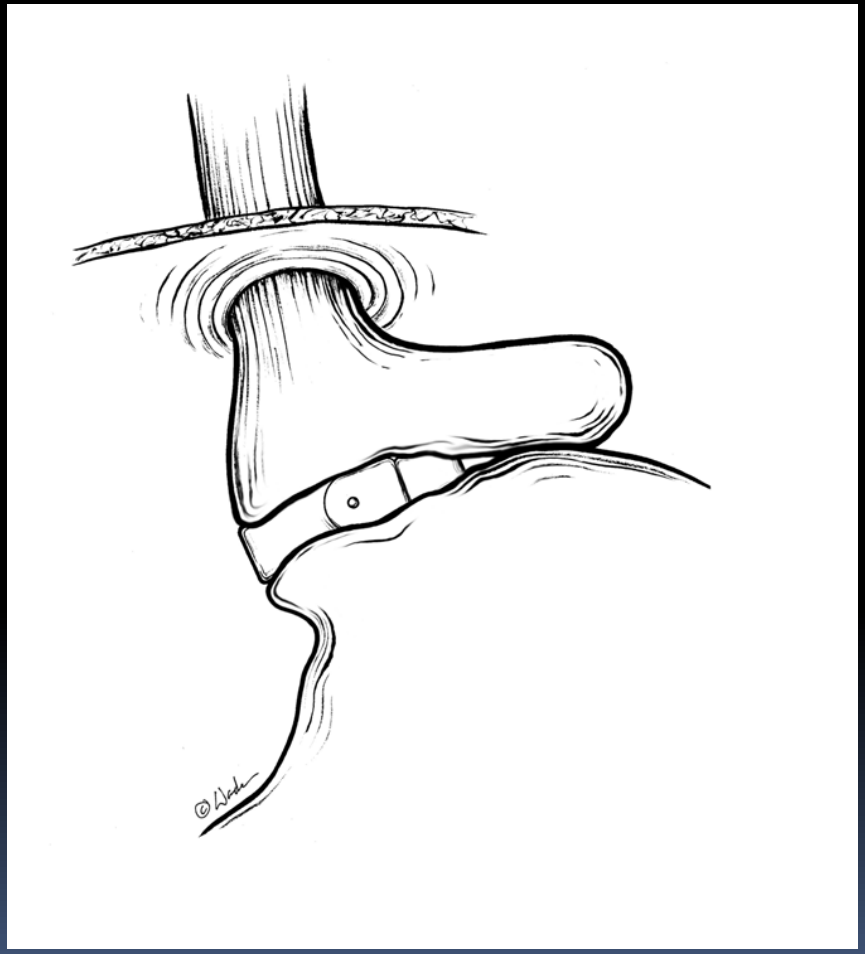


Adjustable Gastric Band

Band Complications

	National Rates	Acosta/Lara
Port infection	9%	0.1%
Band Erosion	7%	0%
Band slip/prolapse	24%	0.1%
Port malfunction	7%	0.1%
Mortality	0.2%	0%

Slipped Band



Procedure Comparison

Gastric Bypass	Sleeve	Gastric Band
70-80% wt loss	70% wt loss	40-50% wt loss
(12-18 months)	(12-18 months)	(24-36 months)
2 night stay	1 night stay	1 night stay
Short recovery time	Short recovery time	Shorter recovery time
Most foods are tolerated	No foreign body	Some foods not tolerated
Possibility of Malnutrition	No Dumping syndrome	Low risk vitamin deficiency
Difficult to reverse	No Intestinal bypass	Easily reversible
Longer proven track record		

Osteoarthritis

- Obese adults are 4 times more likely to develop OA of the knee than non-obese individuals
- 69% of pts. who have received a doctor's diagnosis of arthritis are overweight
- Risks for knee OA increase by 36% for every 2 units of BMI (5kg) of weight gain *(March & Bagga; Med Jnl 2004;180-S6-S10)*
- 59% of Bariatric pts. reduce or discontinue use of arthritis medications one yr. after Bariatric surgery (*Ahorni JH;Obes Surg. 2005;15(5);(641-7.)*
- 89% of patients report complete relief of pain caused by OA in at least one joint after Bariatric surgery.*(Lementowski PW & Zelief SB. Am J Orthop.2008;37(3);148-151)*

Obstructive Sleep Apnea

- Two times more prevalent in obese adults
- Obese pts. represent >70% of patients with OSA
- Resolution in 86% of Bariatric patients (n-1195) in a recent meta-analysis study

(*Bariatric Surgery; A Systematic Review & meta-Analysis; Buchwald H. JAMA 2004;292(14);1724-1737)*

Hypertension

"When indicated, surgical intervention leads to significant improvements in decreasing excess weight and comorbidities that can be maintained over time."

American Heart Association, 2011

(scientific statement Circulation 2011;123)

Hypertension

- HTN is six times more likely in obese pts.
- Each 10kg/22lbs increase in weight =3mm Hg higher systolic blood pressure and 2mm Hg higher diastolic pressure translating to a 12% higher risk of CAD.

(Poirer P, Giles TD, Bra GA, et al. Obesity and Cardiovascular disease: Pathophysiology, evaluation and effect of wt loss: an update of the American Heart Assoc scientific statement from the obesity comm of the Council on nutrition, Phys Activity and Metobalism. Circulation 2006: 113(6);898-918.)

Hypertension

- 62% resolution of HTN after Bariatric surgery associated weight loss
- 78% improvement in patients who don't achieve normalization but may nevertheless be able to reduce HTN medications

(Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. JAMA. 2004;292(14);1724-1737.)

Cardiovascular Risk

- Bariatric Surgery reduces risk of major cardiovascular events

  (Scott JD, et al. Journal of obesity related diseases)

- Bariatric Surgery was associated with a 25-50% risk reduction in the composite index of post op myocardial infarction, stroke and death

  (Large retrospective cohort study)

Lipid Disorders

- Reduction of high cholesterol in 71% of bariatric surgery patients.
- 28% increase in HDL Cholesterol with LRNYGB/LSG in the first year after Bariatric surgery

DIABETES

Acta Medica Scandinavica. Vol. 169, fasc. 6, 1961

Department of Pathology II (Stig Ranström, M. D.), Medicine I (Lars Werkö, M. D.) and Surgery I (Einar Ljunggren, M. D.), Sahlgrenska Sjukhuset, University of Göteborg, Göteborg, Sweden

Amelioration of Diabetes Mellitus Following Gastric Resection

By

L. Angervall, G. Dotevall and H. Tillander

It is of theoretical and practical interest to study the course of diabetes before and after gastric resection. This operation is rarely performed on diabetics, partly due perhaps to the fact that the latter show a relatively low incidence of peptic ulcer (Tillander 1957; Dotevall 1959).

Friedmann et al. (1955) reported three cases of diabetes mellitus in which peptic ulcer supervened and subtotal gastrectomy was performed. In each case the operation was followed by a marked insulinase system of the liver. The results of other investigations suggest that the substance obtained from gastric mucosa is an adrenaline derivative, though the fact that, like glucagon, it cannot be blocked by ergotamine would seem to indicate otherwise (Vuylsteke & de Duve 1959).

Cells whose tinctorial properties resemble those of alpha cells in the islets of Langerhans have been observed in the gastric mucosa (cf. Ferner 1952). It has

DIABETES

"Who Would Have Thought It?"

Diabetes study by Pories, et al

- Gastric Bypass in 330 patients with NIDDM
- Pre-op weight average 304 lbs, 1 year post-op average 198 lbs
- Normal levels of glucose, insulin, glycosylated hemoglobin in 91% of patients for as long as 14 years

Annals of Surgery Vol. 222, No 3, 339-352,1995

DIABETES

Bariatric Surgery: A systematic Review and meta Analysis (***Buchwald et al. JAMA 2004)***

- All articles on bariatric surgery between 1990 and 2003
- 139 studies for a total of 22,094 patients
- DM resolved in 76.8% and improved in 86%

Diabetes

American Diabetes Association, 2009 statement: "Bariatric surgery should be considered for adults with BMI>35 and type 2 diabetes, especially if the diabetes is difficult to control with lifestyle and pharmacologic therapy."

STAMPEDE

STAMPEDE (Surgical Treatment and Medications Potentially Eradicate Diabetes Efficiently).

A randomized, controlled single-center (Cleveland Clinic) study involving 150 pts.

(NEJM. March 26, 2012 Schauer et al.)

STAMPEDE

Primary endpoint-Hg A1C of 6.0% or less @ 1 yr was achieved in:

- 42% pts. In LRNYGB on no diabetes meds
- 37% pts. In Lap Sleeve Gastrectomy
- 12% pts. assigned to intensive medical management based upon ADA guidelines including a Wt. Loss program

At enrollment average Hg A1C was 9.2%, multiple DM meds and 50% were on insulin

F/U of STAMPEDE pts. will continue through 4 yrs.

DIABETES

Bariatric Surgery vs. conventional Med TX for DM 2
(*Migrone et al. N.Engl J. Med. 2012 arch 26*)

- Bariatric Surgery (gastric bypass and BPD) more effective than conventional Tx in controlling T 2 DM
- Randomized single center trial
- End pt. remission defined as BS<100, HgA1C <6.5%
- No diabetes remission in Med Therapy
- 75% had Diabetes remission in GBP group
- 95% had Diabetes remission in BPD group
- Surgical groups had greater wt. loss

Remission of Type 2 DM After Surgery

Study	Type	Percent Remission		
		RYGB	BSG	LAGB
Gan et al. 2007	Prospective	69	33	A
Lee et al. 2011	Randomized Single Blind	93	47	N/A
Vidal et al. 2007	Prospective	62	51	N/A
Benaises et al. 2011	Prospective	92	86	N/A
Nocca et al. 2011	Prospective	66	82	N/A

Foregut Theory

Pournaras et al. *Surgery for Obesity Related Diseases 2012*

Oral vs gastrostomy glucose loading

RESULTS

Exclusion of distal stomach, duodenum and proximal jejunum leads to enhanced insulin incretion and satiety gut hormone response after glucose loading

WEIGHT LOSS INDEPENDENT EFFECT OF T2 DM RESOLUTION

REACTIVE HYPOGLYCEMIA

- Late complications of gastric bypass with abnormally elevated Insulin levels post prandially
- Due to the rapid digestion and absorption of injested carbohydrates with unregulated secretion of insulin by Beta Cells
- Treatment:

  Dietary Modification (low carb)

  Pharmacotherapy (Acarbose)

  Partial Pancreatectomy

THE FUTURE

- Pharmacotherapy (the magic pill)
  Lorcaserin (Belviq),
  Phenteramine/extended release Topiramate (Qsymia)

- New surgical procedures:
  Duodenal Sleeve, intragastric balloon

- Changing BMI parameters to cover patients BMI 30-35

GBP for BMI 30-35

- Brazil (observational retrospective)
- Difficult to control T 2 DM and class 1 obesity
- 100% improvement in glycemic control and 48% resolution of T 2 DM

FAQ

- Excess skin
- Vitamins
- Home medications
- Pregnancy

Process

- PCP referral
- Attend educational seminar
- Initial Consultation
- Psychological Evaluation
- Letter of Medical Necessity to Insurance
- Medical Clearances – from Primary Care Doctor
- Schedule for Surgery

Multidisciplinary Team

- Jorge Acosta, M.D. Co-Medical Director
- Michael D. Lara, M.D. Co-Medical Director
- Denise Porter RN, MBA, NEA-BC Administrative Director
- Sandra Mendoza, RN, CBN, BSN Clinical Coordinator
- Deborah Aguilar, RN, CBN Clinical Coordinator
- Blanka Chavez, RD, LD, Dietitian Coordinator
- Rebecca Arellano, Operations Manager
- Lupe Montoya, Program Assistant
- Sandra Randon, Program Assistant
- Javier Carrillo, Ph.D. Psychologist