Bariatric Surgery: Who … what … when … why … what if?

Sabrena F. Noria, MD., PhD., FRCSC., FACS., FASMBS
Associate Professor of Surgery
Surgical Director, Comprehensive Weight Management,
Metabolic/Bariatric Surgery Program
Department of Surgery, Division of General and Gastrointestinal Surgery
The Ohio State University Wexner Medical Center

MedNet21 Center for Continuing Medical Education

The Ohio State University Wexner Medical Center

Disclosures

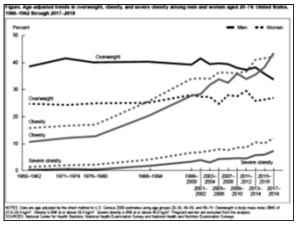
- None

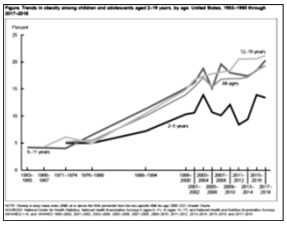
Overview

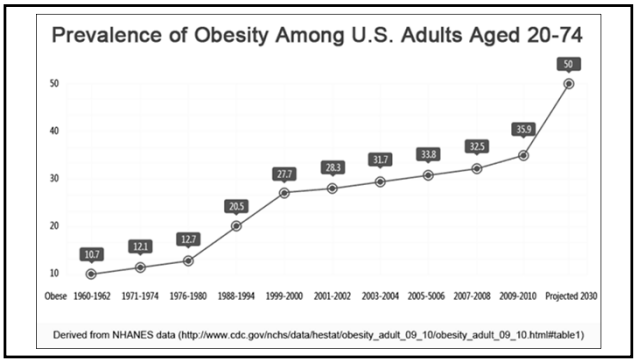
- Why bother with bariatric surgery?
- What operation is right for my patient?
- What are the outcomes … good and bad?
- What about weight regain?

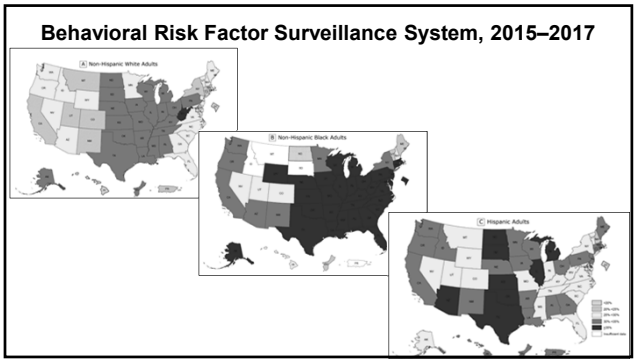
Prevalence of Overweight, Obesity and Severe Obesity[1,2]

Adults Aged ≥20 in the US 1960–1962 through 2017–2018	Children & Adolescents (2-19 yrs) 1963–1965 Through 2017–2018







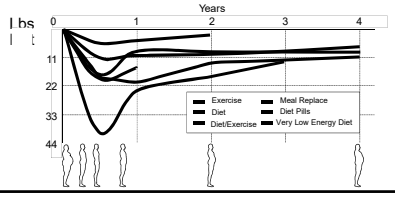


Non-Surgical Weight Loss

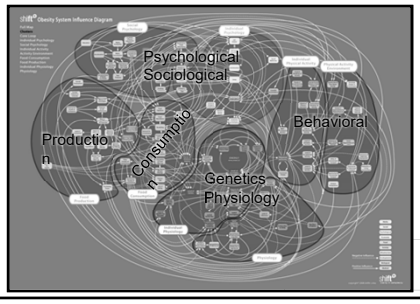
- 7-10% weight loss is the target for lifestyle interventions
- Losing weight is hard … keeping it off is harder!

Non-Surgical Weight Loss

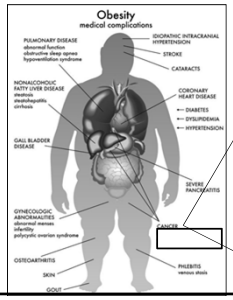
- 7-10% weight loss is the target for lifestyle interventions
- Losing weight is hard … keeping it off is harder!

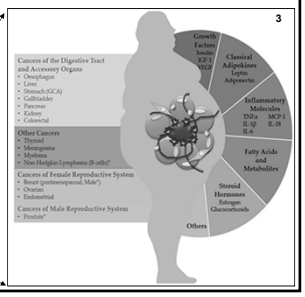


Why is it so hard?



Obesity and Other Co-morbidities





Risk of Cancer

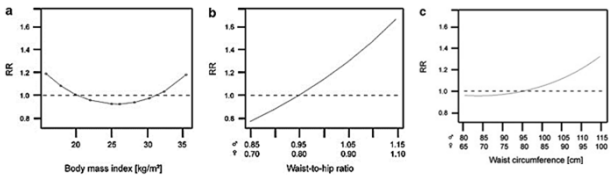
Adult Weight Gain and Adiposity-Related Cancers: A Dose-Response Meta-analysis of Prospective Observational Studies[4]

Relative Risk for 5 kg (11lbs) Increase in Adult Weight Gain			
Cancer	**↑ Risk**	**Women RR (95% CI)**	**Men RR (95% CI)**
Breast cancer (PreM)		0.99 (0.95 – 1.03)	NA
Breast cancer (PostM)	11%	1.11 (1.08 – 1.13)*	NA
PostM Breast Cancer (No HRT)	11%	1.11 (1.08 – 1.13)*	NA
PostM Breast Cancer (HRT)		1.01 (0.99 – 1.02)	NA
PostM Endometrial Cancer (No HRT)	39%	1.39 (1.29 – 1.49)*	NA
PostM Endometrial Cancer (HRT)	9%	1.09 (1.02 – 1.16)*	NA
PostM ovarian Cancer	13%	1.13 (1.03 – 1.23)*	NA
Prostate Cancer		NA	0.98 (0.94 – 1.02)
Colon Cancer	6% ♂	1.03 (0.98 – 1.08)	1.06 (1.03 – 1.10)

* Indicates a linear relationship

Obesity and Mortality[5]

Systematic review and meta-regression: N=693,739 @ 5-24 yrs follow-up



Approach to Weight-Loss

Surgically managed weight loss (Class II Obese and Class III Obese)

BMI	Overweight 25-29	Class I Obese 30-34	Class II Obese 35-39	Class III Obese 40 >
	Diet/Exercise	Medically managed weight loss	With qualifying medical conditions	Don't need medical conditions

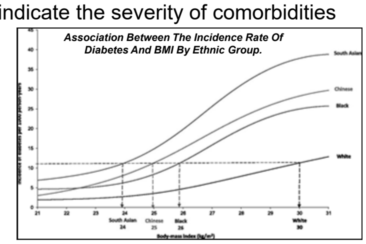
"Only surgery has proven effective over the long term for most patients with clinically severe obesity"

NIH Consensus Conference Statement, 1991

Endorsed by:
- The American Medical Association
- The National Institute of Diabetes and Digestive Disease
- The American Association of Family Practitioners

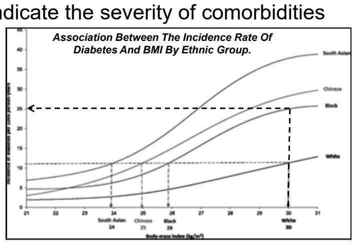
NIH Guidelines … are they reasonable? [6]

- Unigender and uniracial
- Does not reflect the distribution of fat
- Fails to indicate the severity of comorbidities



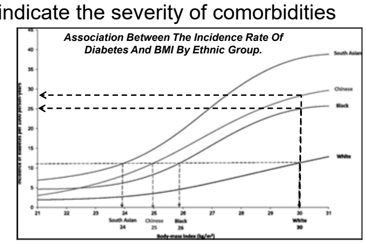
NIH Guidelines … are they reasonable? [6]

- Unigender and uniracial
- Does not reflect the distribution of fat
- Fails to indicate the severity of comorbidities



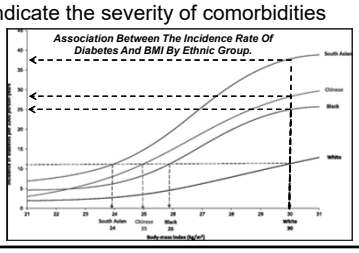
NIH Guidelines … are they reasonable? [6]

- Unigender and uniracial
- Does not reflect the distribution of fat
- Fails to indicate the severity of comorbidities



NIH Guidelines … are they reasonable? [6]

- Unigender and uniracial
- Does not reflect the distribution of fat
- Fails to indicate the severity of comorbidities



Recent Change in Criteria for Bariatric Surgery Coverage

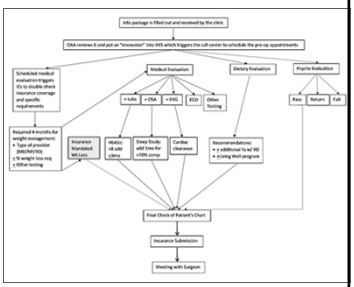
- The 1991 NIH weight criteria for bariatric surgery
  - BMI > 40kg/m^2 or 35 – 39.9kg/m^2 with comorbidities
- Ohio Caresource (Medicare)
  - Patient has BMI of ≥ 30 with type 2 DM with inadequately controlled hyperglycemia (e.g., HbA1c > 8% (64 mmol/mol)
- United Health
  - National coverage decision to remove all 6 month preoperative diets and change to "have participated in a multi-disciplinary pre-operative program" without any time requirement.

Criteria for Surgery

1. BMI ≥ 40 kg/m^2 or BMI = 35–39.9 kg/m^2 with medical problems
2. No known (untreated) endocrine or metabolic causes for obesity
3. No history of substance abuse, eating disorder or major psychiatric problem that is untreated and/or unresolved
4. Attempted medical weight loss treatments without success
5. Understand the risks of the operation and be able to give consent
6. Be prepared to commit to the ***lifestyle changes*** that will be necessary for success after surgery

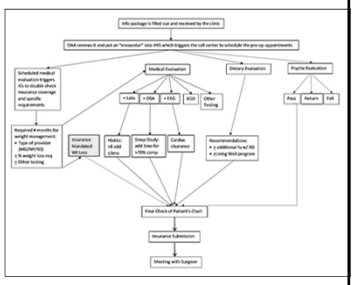
Getting Patients to Surgery (OSU)

1. Information Session
2. Check for insurance coverage
3. Psychological Evaluation
4. Medical Evaluation
5. Upper Endoscopic Evaluation
6. Dietary Evaluation
7. Life After Surgery Classes
8. Insurance Submission & Approval
9. Pre-Surgery Meeting with Surgeon
10. Liver Shrink Diet / OPAC
11. Surgery



Getting Patients to Surgery (OSU)

1. Information Session
2. Check for insurance coverage
3. Psychological Evaluation
4. Medical Evaluation
5. Upper Endoscopic Evaluation
6. Dietary Evaluation
7. Life After Surgery Classes
8. Insurance Submission & Approval
9. Pre-Surgery Meeting with Surgeon
10. Liver Shrink Diet / OPAC
11. Surgery

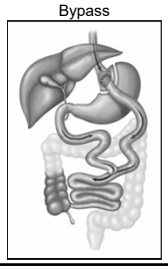


Role of Evaluations in Surgical Decision Making

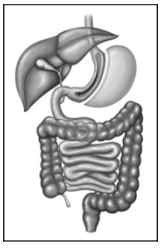
- Psychological Evaluation
  - Implications in weight regain
- Medical Evaluation
  - Diabetes, HTN, HLD, OSA
  - Reflux, HH, PEH
- Upper Endoscopic Evaluation
  - Esophagitis, Barrett's esophagus, Large HH
- Dietary Evaluation
  - Grazing: 16.6% - 46.6%
  - "Sweet-eater"

Common Bariatric Procedures

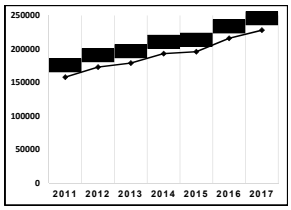
Roux-en-Y Gastric Bypass

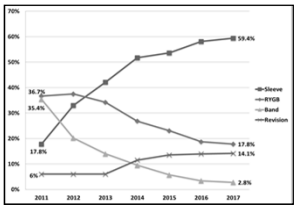


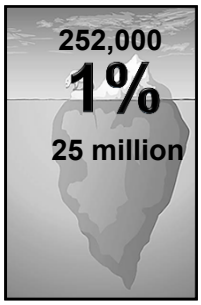
Sleeve Gastrectomy



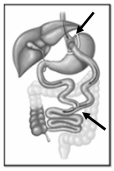
Trends in Procedures Performed

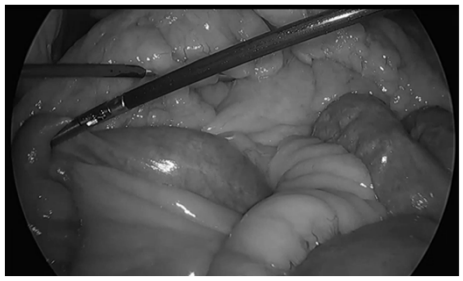






Roux-en-y Gastric Bypass





Sleeve Gastrectomy

Early Major Complications After Bariatric Surgery[7]

Complication	RCTs (%)	OBS (%)
Anastomotic Leak (Mortality risk)	0.09 (0.00)	1.15 (0.12)
MI (Mortality risk)	0.00 (0.00)	0.12 (0.01)
PE (Mortality risk)	NA	1.17 (0.18)

Chang S-H et al. Obes Rev. 2018 Apr; 19(4): 529–537.

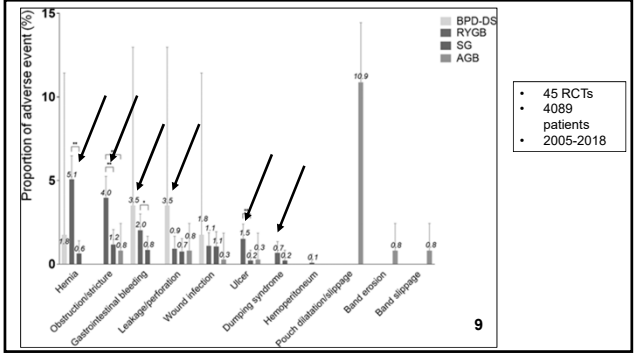
Early Major Complications After Bariatric Surgery[7]

Complication		RCTs (%)	OBS (%)
Anastomotic Leak (Mortality risk)	RYGB	0.09 (0.00)	1.14 (0.04)
	AGB	-	-
	SG	-	1.21 (0.64)
MI (Mortality risk)	RYGB	0.00 (0.00)	0.47 (0.02)
	AGB	-	0.42 (0.00)
	SG	-	0.00 (0.01)
PE (Mortality risk)	RYGB	-	1.55 (0.22)
	AGB	-	0.02 (0.01)
	SG	-	0.25 (0.19)

Chang S-H et al. Obes Rev. 2018 Apr; 19(4): 529–537.

Late Complications[8]

Complication (>6weeks)
• Marginal ulcers
• Marginal strictures
• Bleeding (PUD)
• Internal Hernia
• Nausea/vomiting/dehydration
• Failure to lose weight/weight regain



- 45 RCTs
- 4089 patients
- 2005-2018

Risk of Surgery in Patients with Obesity[10]

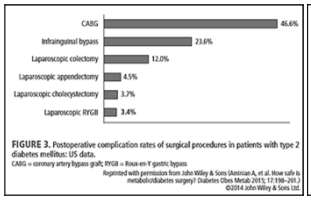


FIGURE 3. Postoperative complication rates of surgical procedures in patients with type 2 diabetes mellitus: US data.
CABG = coronary artery bypass graft; RYGB = Roux-en-Y gastric bypass
Reprinted with permission from John Wiley & Sons (Aminian A, et al. How safe is metabolic/diabetes surgery? Diabetes Obes Metab 2015; 17:198–201.) ©2014 John Wiley & Sons Ltd.

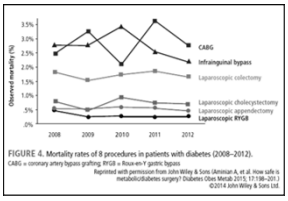


FIGURE 4. Mortality rates of 8 procedures in patients with diabetes (2008–2012).
CABG = coronary artery bypass grafting. RYGB = Roux-en-Y gastric bypass
Reprinted with permission from John Wiley & Sons (Aminian A, et al. How safe is metabolic/diabetes surgery? Diabetes Obes Metab 2015; 17:198–201.) ©2014 John Wiley & Sons Ltd.

Mortality	- Gastric Bypass	(0.14%)
	- Sleeve Gastrectomy	(0.11%)

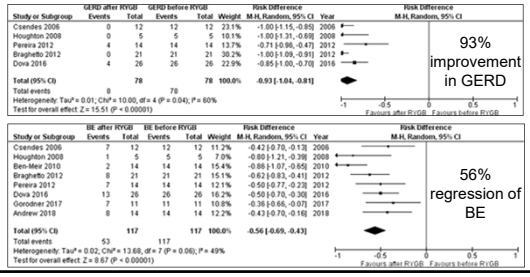
Fitting the Surgery to the Patient

Surgery	Indicated in Patients	Contraindicated in Patients
Roux-en-Y Gastric Bypass	• Diabetes • Reflux/GERD • Barrett's Esophagus • Nissen / HH/PEH • NASH/NAFLD • "Sweet Eater"	• Bowel disease (Crohn's) • Require stomach/GI tract access (polyp/gastritis, PSC) • Transplant candidates
Sleeve Gastrectomy	• Bowel disease (Crohn's) • Previous significant abdominal surgery / ventral hernia • Require stomach/GI tract (polyps/gastritis, PSC) • Transplant candidates	• GERD / Reflux • Barrett's Esophagus • Nissen / HH/PEH

Reflux and the Sleeve Gastrectomy[11]

- 46 studies (10,718 patients)
  - 19% ↑ in reflux in pts with PMH of reflux
  - 23% ↑ of de novo reflux
  - 30% prevalence of esophagitis
  - 6-8% prevalence of Barrett's
  - 8.4% prevalence of GERD
    - 4% conversion to RYGB

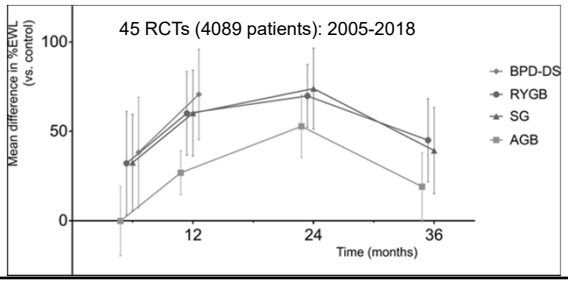
A Systematic Review and Meta-Analysis of the Effect of Roux-en-Y Gastric Bypass on Barrett's Esophagus[12]



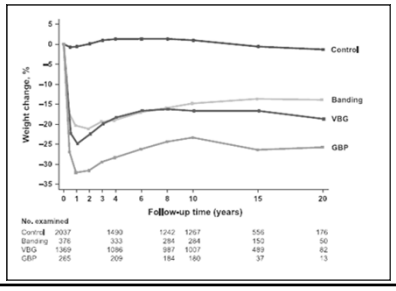
Definitions of Success

- Weight loss
  - >50% EBWL
- Resolution of Comorbidities
  - Diabetes, HTN, Sleep Apnea, Joint pains, Dyslipidemias, Venous Stasis, GERD
- Patient Satisfaction

Impact of Surgery on Weight Loss over 3-years[13]



Long-term Weight Change[14]



Impact on Obesity-Related Comorbidities (3 years)[7]

Comorbidity Resolution or Improvement	RCTs	OBS
Diabetes	92% (n=206)	86% (n=9037)
Hypertension	75% (n=243)	74% (n=962)
Hyperlipidemia	76% (n=279)	68% (n=1477)
Obstructive Sleep Apnea	96% (n=44)	90% (n=9845)
CVD	66% (n=3)	58% (n=27)

Long-term Effects (5-15 yrs) on T2DM and Related Complications[15]

10 Studies (31,429 Patients) that Compared Patients With T2D To Non-surgical Controls

Rate of T2DM Remission	RR = 5.90; 95% CI = 3.75–9.27
Incidence of Microvascular Events	RR = 0.37; 95% CI = 0.30–0.46
Incidence of Macrovascular Events	RR = 0.52; 95% CI = 0.44–0.61
Mortality Rate	RR = 0.21; 95% CI = 0.209–0.213

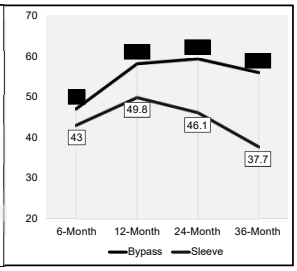
Weight Regain After Bariatric Surgery – What do you do now?

- Weight regain after surgery
  - 7.3% - 87% after RYGB
  - 5.7% - 75.6% after SG
- Who's at risk and why?
- What do you do?

Our Weight-loss Outcomes 2014-2016[16]

Table 9 Independent predictors of poor weight loss at each surgical time point

Covariate	OR	SE	p
Independent predictors of poor weight loss at 12 months			
Sleeve gastrectomy	5.2	2.5	<0.0005
Increasing intake BMI	1.1	0.03	0.001
High school education	0.39	0.19	0.05
Less than high school education	11.9	14.4	0.04
Independent predictors of poor weight loss at 24 months			
Sleeve gastrectomy	5.3	2.2	< 0.0005
African American race	7.1	4.5	0.002
Major depression	4.6	2.1	0.001
Anxiety disorder	0.38	0.19	0.05
Independent predictors of poor weight loss at 36 months			
Sleeve gastrectomy	7.3	5.3	0.006
No-show at 6 months	Dropped from model as it predicted the outcome perfectly		
No-show at 12 months	Dropped from model as it predicted the outcome perfectly		



Weight Regain Following Sleeve Gastrectomy: a Systematic Review[17]

- 21 papers
  - 12 reported definition of regain
  - 9 reported rate of regain
  - 12 reported proposed mechanism of regain
- 5.7% at 2 years up to 75.6 % at 6 years

Proposed Mechanism[17]

- Technical factors contributing to initial sleeve size
  - Bougie size > 40
  - 6cm vs 2cm antral remnant
  - Large fundal remnant
- Sleeve dilatation
- Higher ghrelin levels
- Less follow-up
- Lifestyle behaviors

Predictors Of Weight Regain In Patients Who Underwent Roux-en-y Gastric Bypass Surgery[18]

- Retrospective (2000-2012)
- 1426 patients who had RYGB and achieved >50 %EBWL
- WR = >15% of the 1st year post-op weight

Variables	Univariate analysis			Multivariate analysis		
	Crude odds ratio	*P* value	95% Confidence interval	Adjusted *odds ratio*	*P* value	95% Confidence *interval*
Age (yr)	.97	<.001	.96–.98	.97	.002	.96–.99
Time since RYGB (years)	1.63	<.001	1.53–1.74	1.62	<.001	1.51–1.73
Male	.65	.044	.43–.99			
HT	.73	.025	.55–.96			
Dyslipidemia	.52	<.001	.37–.73			
Insulin treated-T2D	.48	.026	.26–.92			

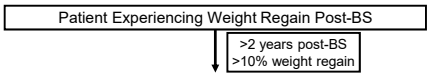
Proposed Mechanism[18]

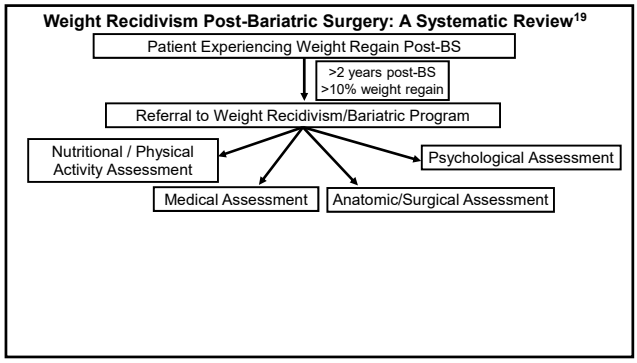
- Technical factors
  - Pouch dilation
  - Stoma dilation
- Resolution of food intolerances (i.e. sugar and dumping)
- Less follow-up
- Lifestyle behaviors (grazing)

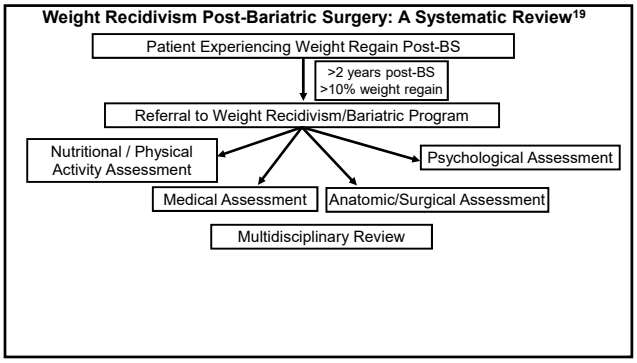
Weight Recidivism Post-Bariatric Surgery: A Systematic Review[19]

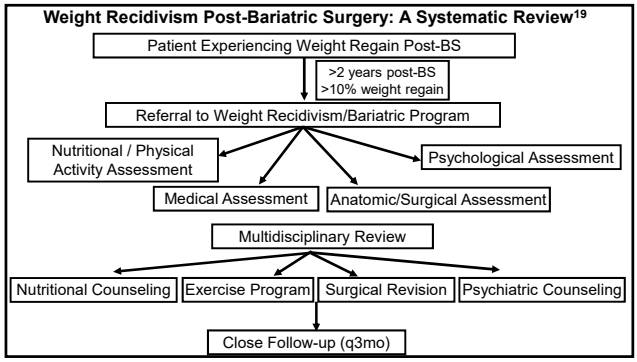
- Causative Factors
  - Nutritional non-compliance/loss of control/grazing
  - Hormonal imbalance (high ghrelin levels)
  - Metabolic imbalance (reactive hypoglycemia)
  - Mental health (BED, impulsive behavioral traits, more psychiatric conditions)
  - Physical inactivity
  - Anatomical /surgical factors

Weight Recidivism Post-Bariatric Surgery: A Systematic Review[19]









Summary

- Bariatric surgery is a durable approach to long-term weight loss in patients with obesity
- Surgery is NOT A CURE
- Long-term weight loss and maintenance is predicated on:
  - Choosing the correct surgery for your patient
  - Surgical technique
  - Patient compliance with lifestyle changes and follow-up

References

1. Fryar CD, Carroll MD, Afful J. Prevalence of overweight, obesity, and severe obesity among adults aged 20 and over: United States, 1960–1962 through 2017–2018. NCHS Health E-Stats. 2020.
2. Fryar CD, Carroll MD, Afful J. Prevalence of overweight, obesity, and severe obesity among children and adolescents aged 2–19 years: United States, 1963–1965 through 2017–2018. NCHS Health E-Stats. 2020
3. Xu YXZ, Mishra S. Obesity-Linked Cancers: Current Knowledge, Challenges and Limitations in Mechanistic Studies and Rodent Models. Cancers (Basel). 2018 Dec 18;10(12):523. doi: 10.3390/cancers10120523. PMID: 30567335; PMCID: PMC6316427.
4. Keum N, Greenwood DC, Lee DH, Kim R, Aune D, Ju W, Hu FB, Giovannucci EL. Adult weight gain and adiposity-related cancers: a dose-response meta-analysis of prospective observational studies. J Natl Cancer Inst. 2015 Mar 10;107(2):djv088. doi: 10.1093/jnci/djv088. PMID: 25757865.

References

5. Carmienke S, Freitag MH, Pischon T, Schlattmann P, Fankhaenel T, Goebel H, Gensichen J. General and abdominal obesity parameters and their combination in relation to mortality: a systematic review and meta-regression analysis. Eur J Clin Nutr. 2013 Jun;67(6):573-85. doi: 10.1038/ejcn.2013.61. Epub 2013 Mar 20. PMID: 23511854.
6. Chiu M, Austin PC, Manuel DG, Shah BR, Tu JV. Deriving ethnic-specific BMI cutoff points for assessing diabetes risk. Diabetes Care. 2011 Aug;34(8):1741-8. doi: 10.2337/dc10-2300. Epub 2011 Jun 16. PMID: 21680722; PMCID: PMC3142051.
7. Chang SH, Stoll CR, Song J, Varela JE, Eagon CJ, Colditz GA. The effectiveness and risks of bariatric surgery: an updated systematic review and meta-analysis, 2003-2012. JAMA Surg. 2014 Mar;149(3):275-87. doi: 10.1001/jamasurg.2013.3654. PMID: 24352617; PMCID: PMC3962512.
8. Hutter, M. M., Schirmer, B. D., Jones, D. B., Ko, C. Y., Cohen, M. E., Merkow, R. P., & Nguyen, N. T. (2011). First report from the American College of Surgeons Bariatric Surgery Center Network: laparoscopic sleeve gastrectomy has morbidity and effectiveness positioned between the band and the bypass. *Annals of surgery*, *254*(3), 410–422. https://doi.org/10.1097/SLA.0b013e31822c9dac

References

9. Cheng B, Truong K, Spitler H, Zhang L, Tong X, Chen L. The Long-Term Effects of Bariatric Surgery on Type 2 Diabetes Remission, Microvascular and Macrovascular Complications, and Mortality: a Systematic Review and Meta-Analysis. Obes Surg. 2017 Oct;27(10):2724-2732. doi: 10.1007/s11695-017-2866-4. PMID: 28801703.
10. Aminian A, Brethauer SA, Kirwan JP, Kashyap SR, Burguera B, Schauer PR. How safe is metabolic/diabetes surgery? Diabetes Obes Metab. 2015 Feb;17(2):198-201. doi: 10.1111/dom.12405. Epub 2014 Nov 19. PMID: 25352176.
11. Yeung KTD, Penney N, Ashrafian L, Darzi A, Ashrafian H. Does Sleeve Gastrectomy Expose the Distal Esophagus to Severe Reflux?: A Systematic Review and Meta-analysis. Ann Surg. 2020 Feb;271(2):257-265. doi: 10.1097/SLA.0000000000003275. PMID: 30921053.
12. Adil MT, Al-Taan O, Rashid F, Munasinghe A, Jain V, Whitelaw D, Jambulingam P, Mahawar K. A Systematic Review and Meta-Analysis of the Effect of Roux-en-Y Gastric Bypass on Barrett's Esophagus. Obes Surg. 2019 Nov;29(11):3712-3721. doi: 10.1007/s11695-019-04083-0. PMID: 31309524.

References

13. Sheng B, Truong K, Spitler H, Zhang L, Tong X, Chen L. The Long-Term Effects of Bariatric Surgery on Type 2 Diabetes Remission, Microvascular and Macrovascular Complications, and Mortality: a Systematic Review and Meta-Analysis. Obes Surg. 2017 Oct;27(10):2724-2732. doi: 10.1007/s11695-017-2866-4. PMID: 28801703.
14. Sjöström L. Review of the key results from the Swedish Obese Subjects (SOS) trial - a prospective controlled intervention study of bariatric surgery. J Intern Med. 2013 Mar;273(3):219-34. doi: 10.1111/joim.12012. Epub 2013 Feb 8. PMID: 23163728.
15. Sheng B, Truong K, Spitler H, Zhang L, Tong X, Chen L. The Long-Term Effects of Bariatric Surgery on Type 2 Diabetes Remission, Microvascular and Macrovascular Complications, and Mortality: a Systematic Review and Meta-Analysis. Obes Surg. 2017 Oct;27(10):2724-2732. doi: 10.1007/s11695-017-2866-4. PMID: 28801703.
16. Jalilvand A, Blaszczak A, Dewire J, Detty A, Needleman B, Noria S. Laparoscopic sleeve gastrectomy is an independent predictor of poor follow-up and reaching ≤ 40% excess body weight loss at 1, 2, and 3 years after bariatric surgery. Surg Endosc. 2020 Jun;34(6):2572-2584. doi: 10.1007/s00464-019-07023-2. Epub 2019 Jul 29. PMID: 31359199.

References

17. Lauti M, Kularatna M, Hill AG, MacCormick AD. Weight Regain Following Sleeve Gastrectomy-a Systematic Review. Obes Surg. 2016 Jun;26(6):1326-34. doi: 10.1007/s11695-016-2152-x. PMID: 27048439.
18. Shantavasinkul PC, Omotosho P, Corsino L, Portenier D, Torquati A. Predictors of weight regain in patients who underwent Roux-en-Y gastric bypass surgery. Surg Obes Relat Dis. 2016 Nov;12(9):1640-1645. doi: 10.1016/j.soard.2016.08.028. Epub 2016 Aug 21. PMID: 27989521.
19. Karmali S, Brar B, Shi X, Sharma AM, de Gara C, Birch DW. Weight recidivism post-bariatric surgery: a systematic review. Obes Surg. 2013 Nov;23(11):1922-33. doi: 10.1007/s11695-013-1070-4. PMID: 23996349.

The Journey of Bariatric Surgery: A Dietitian's Perspective

Roy Gildersleeve RDN, LD
Staff Dietitian
Comprehensive Weight Management
Metabolic and Bariatric Surgery
The Ohio State University Wexner Medical Center

MedNet21 Center for Continuing Medical Education

The Ohio State University Wexner Medical Center

Objective

- Understand the dietary evaluation process
- Preparing patients for life after bariatric surgery
- Importance of the Liver Shrink Diet
- Understand the post-op diet advancements and complications

Dietary Evaluation

Initial appointment:

- Build rapport
- Determine limitations/barriers
- Determine potential pitfalls
- Set goals/expectations
- Assess patient's previous experiences with diet and exercise

https://thenounproject.com/term/patient-with-doctor/1576152/

Do they have the tools necessary to be successful after surgery?

Dietary Evaluation

- **Demographics**
  - Employment, age, support, mobility, literacy, potential barriers/motivations
  - Dietary restrictions (religion/culture, allergies, intolerances, diseases)
  - Recent weight trends
- **Behaviors**
  - Previous dieting attempts
  - Disinhibited eating
  - Binge eating
  - Meal prep vs. eating out
  - FFQ
  - Exercise routine
  - 24 Hour Food recall
  - Meal skipping
  - Fluid intake

Dietary Evaluation

Not Ready

Get people into the post-bariatric surgery routine BEFORE surgery

- At least 3 months of pre-surgery education
- If patient is planning on following up with PCP, re-evaluation
- Time sensitive (the longer a patient is held up the worse the outcomes tend to be)

Ready

Patient have tools/skills necessary to be successful post-surgery

- Move onto the "Life After Surgery" classes
- Follow-up as needed

Preparation for Surgery

Education

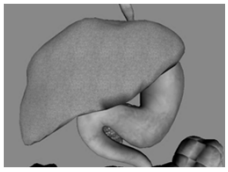
- Calorie intake
- Macronutrients
  - Sources, portion sizes, importance
- Label reading
- Meal prep/planning
- Troubleshoot disinhibited eating
  - Boredom/emotional eating
  - Trigger foods

Behaviors

- 5-6 small/frequent meals
- Limiting sugar and sugar alcohols to under 10 grams/meals
- Above 64 fl oz water while **sipping**
- Separating fluid/food by 30 minutes
- Wean off caffeine/alcohol, eliminate carbonation
- Begin multivitamin/prenatal
- 60-80 grams protein minimum
- Limit eating out to less than 2x/week

Preparation for Surgery

- Liver Shrink Diet
  - 3 levels depending on weight and sex
  - Shrink the liver to make surgery safe
    - 1000 calories or less
    - At least 100 grams protein
    - Under 70 grams carbs
    - At least 64 fl oz of decaf/unsweetened fluid
    - Combination of food and ONS



https://en.wikipedia.org/wiki/File:Anterior_view_of_the_liver.jpg

Poor compliance could prevent surgeon from performing surgery safety.

Sample Day	
Breakfast	1 protein shake
Snack	1 fruit + 1 protein shake
Lunch	Salad (non-starchy vegetables only) 2 tbsp light dressing
Snack	1 protein shake
Dinner	6 oz lean meat 1 cup non-starchy vegetables
Snack	1 protein shake

Preparation for Surgery

- Step II Diet "Warm Up"
  - Encourage patients to start slowly with pureed food and allow their stomachs to heal
  - Recommend patient's use 2-3 protein shakes and add in one new food:
    - Unsweetened applesauce
    - Sugar-free pudding
    - Sugar-free jello
    - Yogurt

https://commons.wikimedia.org/wiki/File:Protein_shake.jpg

Step II Diet

2 weeks for RNY/ 1 month for sleeve gastrectomy

Goals

- Pureed/Smooth
- +60 grams protein
- 64 fl oz sugar/caffeine free beverages (sipped)
- 5-6 small meals
  - ¼ cup portion
- 2 chewable MVI

Tools

- Blender
- Unflavored protein powder
- Protein shakes/waters
- Timers
- Pre-portioned containers
- Water bottles
- Baby utensils

Step III Diet

1 month for both RNY and sleeve gastrectomy

Goals

- Soft/tender foods
- Chewing slowly
- +60 grams protein
- 64 fl oz sugar/caffeine free beverages (sipped)
- 5-6 small meals
  - ¼ to ½ cup
- Updated vitamin regimen
  - Life long

Tools

- Crockpot/pressure cooker
- Low fat gravy/sauces/dressing
- Food records
- Pill containers
- Pre-portioned containers
- Baby utensils

Vitamin Regimen

À la carte

- 2 adult multivitamins or 1 prenatal
- 1,200-1,500 mg calcium citrate
- 500 mcg Vitamin B12 (sublingual)
- 3000 IU vitamin D3
- 45-60 mg elemental iron

Bariatric supplements

- Bariatric Fusion
- Celebrate
- My Bariatric Vitamins
- Bariatric Advantage

additional supplementation may be required based on patient's lab levels

Sample Day

- Morning (8 am)
  - 1 multivitamin + Vit B12 500 mcg (sublingual)
- Midday (12 pm)
  - Calcium citrate (500-600 mg)
- Evening (5 pm)
  - Calcium citrate (500-600 mg) + Vit D3 (2000 IU)
- Before Bed (9 pm)
  - 1 multivitamin

https://www.pxfuel.com/en/free-photo-otaua

Step IV Diet

Life long for both RNY and sleeve gastrectomy

Goals

- Slowly introducing raw fruits/vegetables
- Chewing slowly
- +60 grams protein
- + 64 fl oz sugar/caffeine free beverages (sipped)
- 5-6 small meals
  - ½ cup to 1 cup

Tools

- Pre-portioned containers
- Baby utensils
- Food records
- Timers
- Cookbooks/recipes
- Regular Follow-Up

Complications

Typically develop due to chronic nausea/vomiting or struggles with planning

Dehydration

- Set timers
- Medicine cups
- Use water bottles with times
- Water enhancers/Flavored waters
- Sugar-free Popsicles/Jello
- Broth (low sodium-fat)
- Hydrate Spark 2.0

Inadequate Protein Intake

- Unflavored protein powder
- Protein shake popsicles
- Savory protein supplements
- Protein waters
- Prioritizing protein
- Revisit previous diet step

Follow-Up

- Ensure compliance with step IV diet
  - Portion size (ie. Cottage Cheese Test)
  - Vitamin regimen
  - "Pouch Reset"
- Assess new pitfalls/barriers
- Support
- Update goals/expectations
- Exercise
- Stress/emotions

https://www.flickr.com/photos/30478819@N08/5075324001 2

References

- https://asmbs.org/resources/aace-tos-asmbs-oma-asa-clinical-practice-guidelines-for-the-perioperative-nutritional-metabolic-and-nonsurgical-support-of-the-bariatric-surgery-patient-2020
- Guidelines for Clinical Application of Laparoscopic Bariatric Surgery - A SAGES Publication
- https://www.mayoclinic.org/tests-procedures/bariatric-surgery/about/pac-20394258
- https://www.niddk.nih.gov/health-information/weight-management/bariatric-surgery/types