

Weight loss, resolution of Co-morbidities, and
long-term complications of bariatric surgery:
Adjustable gastric band vs sleeve gastrectomy vs
open roux-en-y gastric bypass vs laparoscopic
roux-en-y gastric bypass vs duodenal switch in
166,601 bold database patients

Finley C, Slotman G, Adams M
Inspira Health Network
Department of General Surgery
Vineland, NJ



Introduction

- Principal bariatric surgeries:
 - Adjustable Gastric Banding (AGB)
 - Duodenal Switch (DS)
 - Laparoscopic Roux-en-Y Gastric Bypass (LRYGB)
 - Open Roux-en-Y Gastric Bypass (ORYGB)
 - Sleeve Gastrectomy (SLEEVE)
- The outcomes of all these procedures have not been directly compared to each other

Objective

- To identify the comparative efficacy in post-op weight, BMI, and resolution of obesity-related co-morbidities between these 5 operations

Methods

- 166,601 BOLD database patients
- Data collected pre-op and at 6, 12, 18, and 24 months
- ANOVA and general linear models modified for bimodal distribution tested baseline data
- General linear models including baseline and treatment analyzed post-op data
- Chi-squared for outcomes rank distribution

Bariatric Outcome Variables

- Weight (kg)
- BMI
- Diabetes Mellitus
- HTN
- CHF
- Liver disease
- Cholelithiasis
- Obstructive sleep apnea
- Pulmonary Hypertension
- Angina
- Obesity Hypoventilation Syndrome
- Asthma
- Panniculitis
- Urinary incontinence
- Hyperlipidemia
- GERD
- PVD
- Polycystic Ovarian Syndrome
- Pseudotumor cerebri
- Lower extremity edema
- Musculoskeletal pain
- Back pain
- Depression
- Mental health disease
- Abdominal hernia
- Impaired function
- Psychological impairment
- Tobacco abuse
- Etoh abuse
- Substance abuse
- Gout

Weight (kg)

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	125 _{±.09}	112 _{±.04}	107 _{±.07}	103 _{±.12}	102 _{±.15}
DS	149 _{±.81}	91 _{±.27}	77 _{±.46}	72 _{±.88}	71 _{±1.2}
LRYGB	133 _{±.09}	94 _{±.04}	84 _{±.07}	81 _{±.16}	80 _{±.19}
ORYGB	141 _{±.46}	94 _{±.15}	85 _{±.25}	81 _{±.47}	82 _{±.54}
SLEEVE	134 _{±.34}	98 _{±.15}	90 _{±.31}	88 _{±.75}	86 _{±1.1}
p-value	<0.001	<0.0001	<0.0001	<0.0001	<0.0001

BMI

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	125 _{±.09}	112 _{±.04}	107 _{±.07}	103 _{±.12}	102 _{±.15}
DS	149 _{±.81}	91 _{±.27}	77 _{±.46}	72 _{±.88}	71 _{±1.2}
LRYGB	133 _{±.09}	94 _{±.04}	84 _{±.07}	81 _{±.16}	80 _{±.19}
ORYGB	141 _{±.46}	94 _{±.15}	85 _{±.25}	81 _{±.47}	82 _{±.54}
SLEEVE	134 _{±.34}	98 _{±.15}	90 _{±.31}	88 _{±.75}	86 _{±1.1}
p-value	<0.001	<0.0001	<0.0001	<0.0001	<0.0001

Hypertension

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	55.3	48.38	45.43	43.85	41.24
DS	62.82	40.51	31.66	30.34	26.24
LRYGB	60.4	39.71	33.32	30.3	28.65
ORYGB	61.79	46.17	43.21	43.01	40.75
SLEEVE	55.01	41.17	35.53	34.46	28.66
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Diabetes Mellitus

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	29.73	22.96	21.57	20.03	18.54
DS	42.08	18.02	10.5	12.82	9.22
LRYGB	38.93	19.43	14.59	12.69	11.36
ORYGB	39.01	23.95	20.36	18.35	16.33
SLEEVE	30.62	18.29	15.48	15.69	10.37
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

GERD

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	42.44	28.38	26.17	25.81	24.66
DS	50.75	40.99	35.7	38.89	36.88
LRYGB	49.74	28.22	24.27	23.59	21.95
ORYGB	42.29	28.69	26	26.49	28.61
SLEEVE	42.98	35.15	0.81	35.08	32.93
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Liver Disease

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	4.22	3.76	3.48	3.51	3.2
DS	6.16	10.39	9.37	9.83	8.51
LRYGB	7.18	6.69	6.45	6.78	4.48
ORYGB	11.19	12.26	11.62	9.6	10.69
SLEEVE	4.94	4.09	4.34	4.62	3.05
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Obstructive Sleep Apnea

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	39.03	33.19	29.81	27.69	24.73
DS	60.79	45.85	35.7	38.46	30.5
LRYGB	48.03	32.26	25.22	22.4	19.88
ORYGB	49.99	38.23	30.98	28.55	24.86
SLEEVE	42.98	32.14	26.05	27.69	18.29
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Cholelithiasis

Bariatric Procedure	Pre-Op	6 months	12 months	18 months	24 months
AGB	16.83	16.77	17.15	17.74	17.59
DS	21.76	38.99	45.72	53.42	50.35
LRYGB	21.58	21.81	22.67	23.19	22.53
ORYGB	19.37	19	19.36	17.13	19.22
SLEEVE	18.18	19.19	21.13	25.23	27.44
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Mean of 31 Outcomes at 24 Months Ranked 1 to 5

- AGB – 2.48
- LRYGB – 2.48
- SLEEVE – 2.55
- ORYGB – 3.39
- DS – 3.61

Distribution of 31 Outcomes at 24 Months

Rank (1 to 5) for each outcome	Rank 1 and 2	Rank ≥ 3
AGB	61%	39%
LRYGB	48%	52%
SLEEVE	45%	55%
DS	29%	71%
ORYGB	16%	84%

P = 0.003

Conclusions

- Resolution of outcomes vary significantly
- AGB scores highest overall, relatively. However, weight loss is least
- DS has greatest weight loss, but highest post-op cholelithiasis
- HTN and DM resolved best by DS, LRYGB, SLEEVE
- Maximum resolution of OSA by LRYGB, SLEEVE
- Liver disease unchanged after bariatric surgery
- Outcomes variation may be related to the characteristics of each procedure's respective patient population