

Supplementary Online Content

Yu EW, Kim SC, Sturgeon DJ, Lindeman KG, Weissman JS. Fracture risk after Roux-en-Y gastric bypass vs adjustable gastric banding among Medicare beneficiaries. *JAMA Surg*. Published online May 15, 2019. doi:10.1001/jamasurg.2019.1157

eTable 1. Definition of Fracture Outcomes

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eFigure 2. Time to Nonvertebral Fracture After RYGB and AGB Within PS-Matched Cohort.

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Definition of Fracture Outcomes

Fracture	Definition
Humerus	Humerus fracture diagnosis (ICD-9: 812.xx, 733.11) AND procedure within 30 days of fracture date (ICD-9: 78.52, 79.01, 79.11, 79.21, 79.31, 79.61; CPT-4: 23600, 23605, 23610, 23615, 23620, 23625, 23630, 23665, 23670, 23680, 24500, 24505, 24506, 24510, 24515, 24530, 24531, 24535, 24536, 24538, 24540, 24542, 24545, 24560, 24565, 24570, 24575, 24581, 24583, 24585-8, 24516)
Wrist	Radius/ulna fracture diagnosis (ICD-9: 813.xx, 733.12) AND procedure within 30 days of fracture date (ICD-9: 78.53, 79.02, 79.12, 79.22, 79.32, 79.62; CPT-4: 24620, 24625, 24635, 24650, 24655, 24660, 24665-6, 24670, 24680, 24685, 25500, 25505, 25510, 25515, 25530, 25535, 25540, 25545, 25560, 25565, 25570, 25575, 25600, 25605, 25610-1, 25615, 25620, 25650)
Hip	Hip fracture diagnosis (ICD-9 code: 820.xx,733.14,733.96) during hospitalization AND procedure code during hospitalization (ICD-9: 78.55, 79.05, 79.15, 79.25, 79.35, 79.65; CPT-4: 27230, 27232, 27235-6, 27238, 27240, 27244-6, 27248, 27267, 27268, 27269, 27125, 27130)
Pelvis	Pelvis fracture diagnosis (ICD-9: 808.xx, 733.98), CPT codes (27193, 27194, 27200, 27202, 27215, 27216, 27217, 27218, 27220, 27222, 27226, 27227, 27228)

eTable 2. Baseline Characteristics in 365-Days Before RYGB or AGB Surgery Within Propensity Score (PS)–Matched Cohort

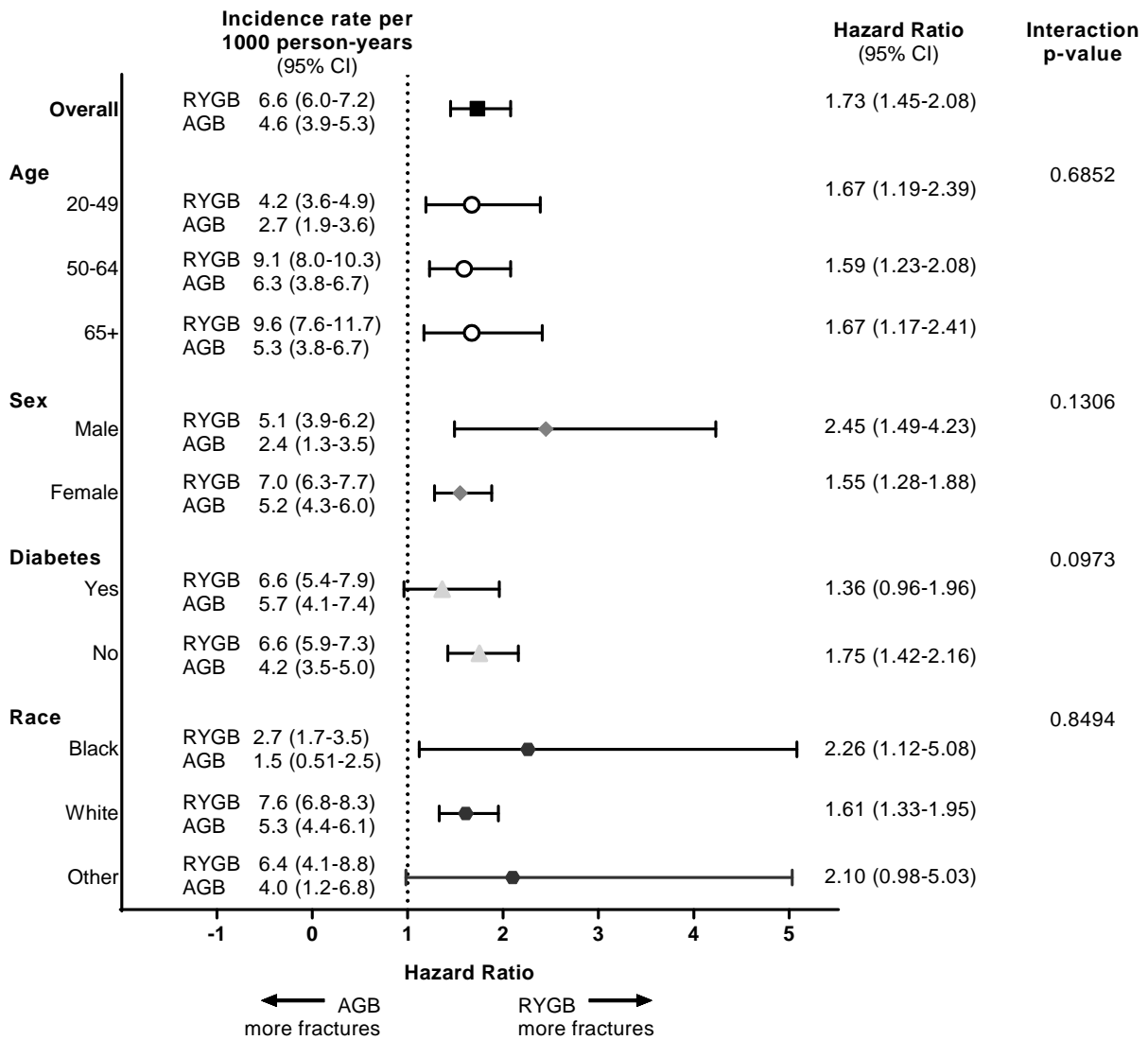
		RYGB N=12,183	AGB N=12,183	RYGB vs. AGB
		Percent (%) or mean ± SD	Percent (%) or mean ± SD	Standardized difference of mean
Demographic				
Age, years		54 ± 12	54 ± 12	-0.009
Female, %		78%	78%	-0.002
Geographic region	Midwest, %	24.4	24.2	0.016
	Northeast, %	17.3	17.4	
	South, %	41.7	41.4	
	West, %	16.5	16.9	
Comorbidities				
Combined comorbidity score**		0.9 ± 1.6	1.0 ± 1.7	0.010
HTN, %		62.8	63.2	-0.008
Hyperlipidemia, %		49.9	49.7	0.005
Diabetes, %		21.8	21.9	-0.003
COPD, %		29.5	29.3	0.003
Smoking, %		13.4	13.2	0.006
CHD, %		24.4	24.7	-0.007
Fatty liver, %		8.9	6.9	0.071
Chronic liver disease, %		9.3	7.5	0.067
Osteoporosis, %		3.0	3.0	-0.002
Medications				
Antihypertensives, %		41.8	41.6	0.005
NSAIDs, %		34.5	34.5	0.001
SSRIs, %		30.5	30.7	-0.003
PPIs, %		27.7	28.0	-0.006
Benzodiazepines + other sleeping pills, %		14.6	14.4	0.004
Statins, %		33.0	32.9	0.003
Oral glucocorticoids, %		24.0	24.2	-0.005
Beta blockers, %		20.0	20.1	-0.003
Thyroid meds, %		14.9	15.5	-0.016
TZDs, %		39.1	39.1	0.0003
Insulin, %		12.6	13.1	-0.015
Osteoporosis meds, %		2.0	2.2	-0.015
Health care utilization				
Number of doctor visits, N		5.0 ± 7.3	5.0 ± 7.4	0.002
Number of hospitalizations, N		0.16 ± 0.53	0.16 ± 0.52	-0.004
Number of ER visits, N		0.72 ± 1.8	0.72 ± 2.5	-0.004
BMD ordered, %		5.5	5.3	0.008

HTN = Hypertension; COPD = Chronic Obstructive Pulmonary Disease; CHD = Chronic Heart Disease; NSAIDs = Nonsteroidal Anti-Inflammatory Drugs; SSRIs = Selective Serotonin Reuptake Inhibitors; PPIs = Proton Pump Inhibitors; TZDs = thiazolidinediones; BMD = Bone Mineral Density

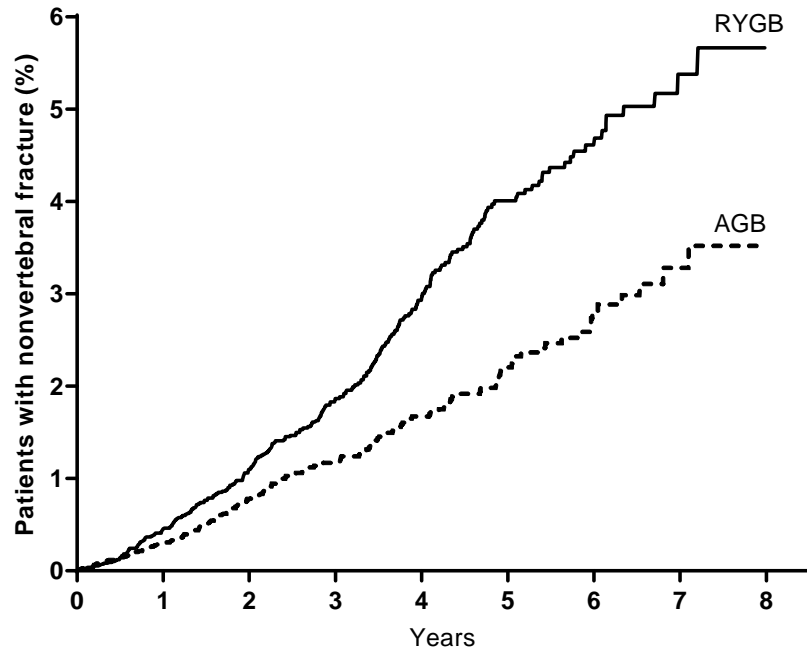
eTable 3. Incidence Rates (IRs) and Hazard Ratios (HRs) for Fracture in PS-Matched Cohort

Outcome	Group	No. of Events	Person-years	IR/1000 Person Years (95% CI)	HR (95% CI)
Any Fracture	RYGB	256	33,817	7.6 (6.6-8.5)	1.68 (1.38-2.05)
	AGB	157	34,850	4.5 (3.8-5.2)	Ref.
Wrist Fracture	RYGB	148	33,817	4.4 (3.7-5.1)	1.66 (1.28-2.16)
	AGB	92	34,850	2.6 (2.1-3.2)	Ref.
Hip Fracture	RYGB	56	33,817	1.7 (1.2-2.1)	2.51 (1.57-4.16)
	AGB	23	34,850	0.7 (0.4-0.9)	Ref.
Humerus Fracture	RYGB	12	33,817	0.5 (0.3-0.8)	1.54 (0.75-3.29)
	AGB	18	34,850	0.3 (0.1-0.5)	Ref.
Pelvis Fracture	RYGB	57	33,817	2.3 (1.8-2.9)	1.39 (0.96-2.03)
	AGB	79	34,850	1.6 (1.2-2.1)	Ref.

eFigure 1. Hazard Ratios for Nonvertebral Fracture After RYGB and AGB Stratified by Age, Sex, Diabetes Status, and Race



eFigure 2. Time to Nonvertebral Fracture After RYGB and AGB Within PS-Matched Cohort.



Number at risk:	RYGB	12183	9076	7335	5563	3952	2501	1288	925
	AGB	12183	9426	7614	5696	4052	2521	1296	439
Number of fractures:	RYGB	--	45	53	50	51	37	12	8
	AGB	--	31	41	27	25	17	11	5