



# ROLE OF ROBOTIC SURGERY IN REVISIONAL BARIATRIC PROCEDURES: A SEVEN-YEAR EXPERIENCE

Rocio Castillo-Larios MD, Jorge Cornejo MD,

[Enrique F. Elli MD](#)

Chair of Adv GI & Bariatric Surgery

Mayo Clinic Florida



# Background

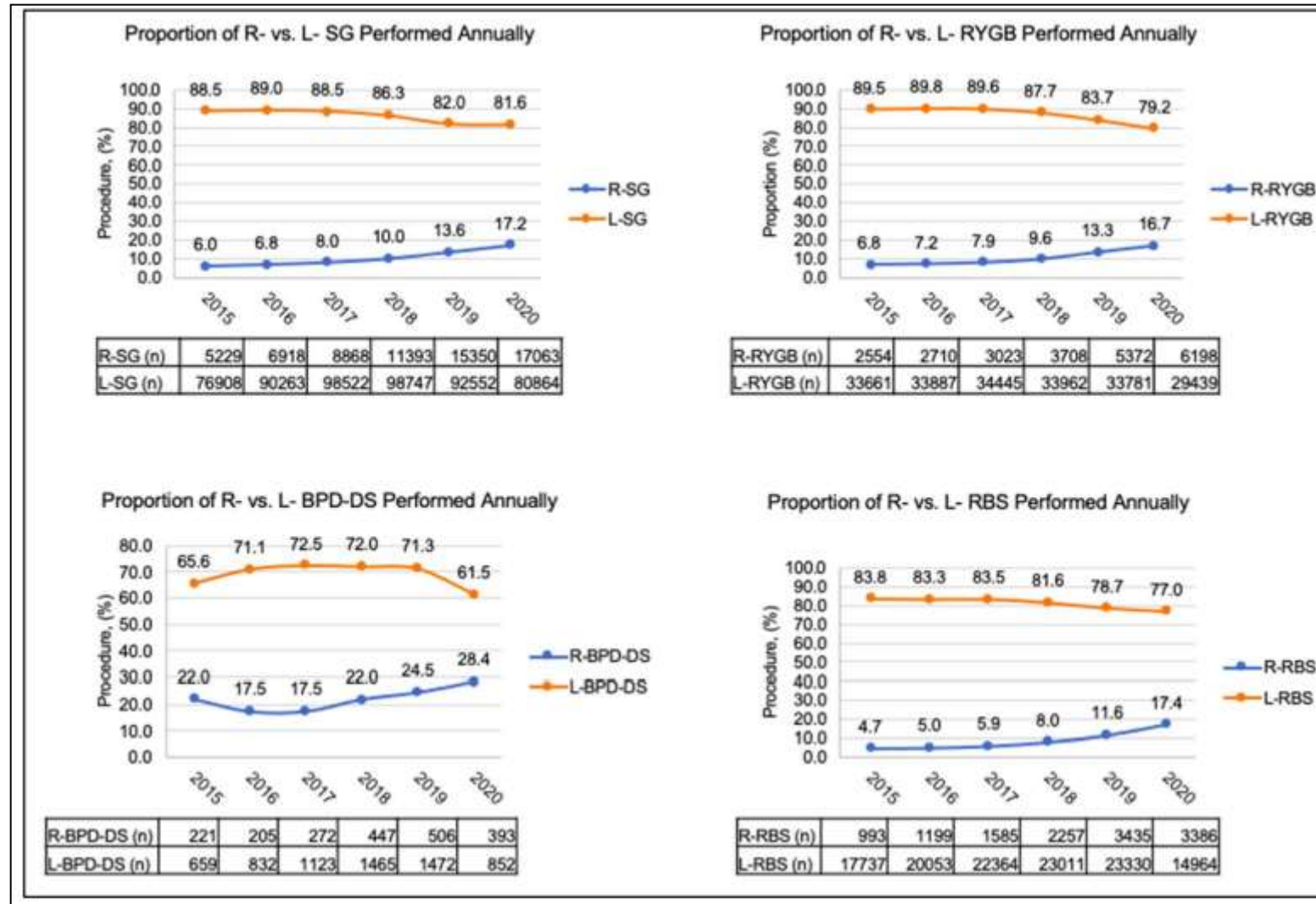
- 2019 → **256,000** bariatric surgeries performed in the US.
- **28%** of all bariatric procedures will **require a revision.**
- RBSs have **increased by 311%** since 2011.
- **IWL** is the most common indication.
- Robotic Bariatric Surgery → **Controversy on outcomes based on published data**





## Current Trends in the Utilization of a Robotic Approach in the Field of Bariatric Surgery

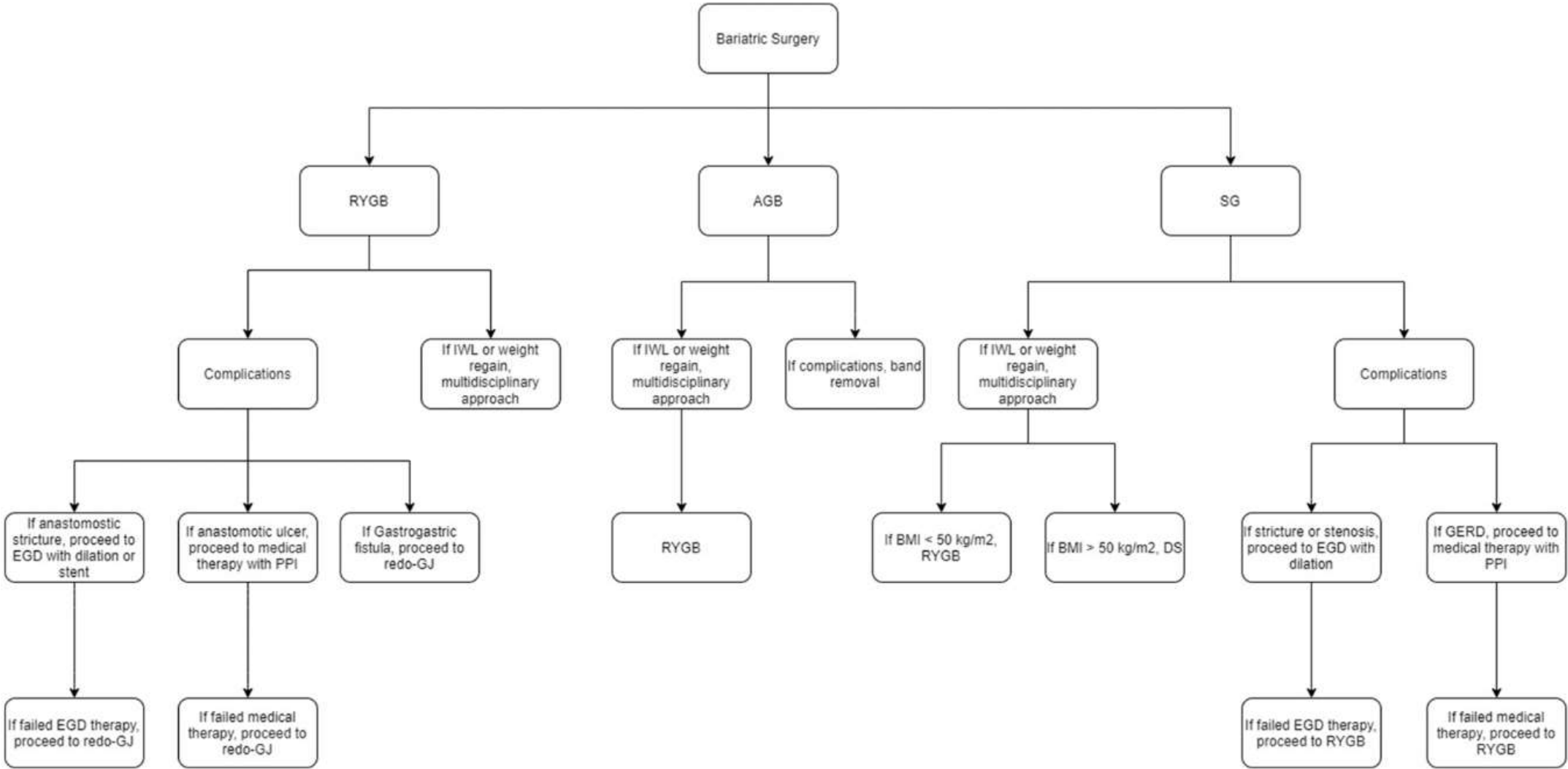
Wayne B. Bauerle<sup>1</sup> · Pooja Mody<sup>2</sup> · Allison Estep<sup>2</sup> · Jill Stoltzfus<sup>3</sup> · Maher El Char<sup>2</sup>



# Methods

- Robotic RBS between **January 1, 2016, and May 31, 2022**
  - **106 robotic revisional bariatric cases.**
- Pre-operative Work-up:
  - Evaluation by **Multidisciplinary Bariatric Team**
  - Upper gastrointestinal series
  - Upper digestive endoscopy
  - Reflux symptoms → 24-hour pH monitoring
  - Dysphagia → Manometry

# Decision-Making Algorithm in RBS



# Demographics and Clinical Characteristics

- **106** patients were included with a median BMI of **40.8 kg/m<sup>2</sup>**.
- Primary procedure: **AGB (41.5%)**, followed by **SG (39.6%)**.
- **59.4%** had presented with **reflux** symptoms.
- **29.2%** were **asymptomatic**.
- Median time to revision: **8 years**.

	Revisional Bariatric Surgery			
	Total (N = 106)	RYGB (N = 85)	Redo-GJ (N = 16)	DS (N = 5)
<b>Age at Surgery</b>				
Median (range)	52.7 (23-78)	54 (23-78)	52 (41-75)	46 (36-57)
<b>Sex</b>				
Female (%)	84 (79.2%)	65 (76.5%)	14 (87.5%)	5 (100%)
Male (%)	22 (20.8%)	20 (23.5%)	2 (12.5%)	0 (0%)
<b>Race</b>				
Black or African American	19 (18%)	17 (20%)	15 (93.8%)	2 (40%)
White	79 (74.5%)	61 (71.8%)	1 (6.2%)	3 (60%)
Other	8 (7.5%)	7 (8.2%)	0 (0%)	0 (0%)
<b>Pre-operative Weight (Kg)</b>				
Median (range)	113.1 (50.2-204)	114.8 (67.5-204)	90.45 (50.2-137)	157 (136.8-174)
<b>Pre-operative BMI (Kg/m<sup>2</sup>)</b>				
Median (range)	40.8 (17.87-64.71)	41.16 (24-60.31)	32.48 (17.87-44.77)	54.13 (52-64.71)
<b>Comorbidities (%)</b>				
Hypertension	57 (53.8%)	47 (55.3%)	8 (50%)	2 (40%)
Diabetes Mellitus	27 (25.5%)	25 (29.4%)	2 (12.5%)	0 (0%)
Hyperlipidemia	55 (51.9%)	51 (60%)	3 (18.8%)	1 (20%)
Obstructive Sleep Apnea	60 (56.6%)	53 (62.4%)	4 (25%)	3 (60%)
GERD	86 (81.1%)	71 (83.5%)	12 (75%)	3 (60%)
<b>Symptoms</b>				
Nausea / Vomiting	24 (22.6%)	13 (15.3%)	10 (62.5%)	1 (20%)
Dysphagia	28 (26.4%)	23 (27.1%)	5 (31.3%)	0 (0%)
Reflux	63 (59.4%)	52 (61.2%)	10 (62.5%)	1 (20%)
Abdominal Pain	9 (8.5%)	3 (3.5%)	5 (31.3%)	1 (20%)
Asymptomatic	31 (29.2%)	28 (32.9%)	0 (0%)	3 (60%)
<b>Index Bariatric Surgery</b>				
Duodenal Switch	1 (0.9%)	0 (0%)	1 (6.3%)	0 (0%)
Gastric Banding	44 (41.5%)	43 (50.6%)	0 (0%)	1 (20%)
RYGB	18 (17%)	3 (3.5%)	14 (87.5%)	1 (20%)
Sleeve Gastrectomy	42 (39.6%)	38 (44.7%)	1 (6.3%)	3 (60%)
Vertical Banded Gastroplasty	1 (0.9%)	1 (1.2%)	0 (0%)	0 (0%)
<b>More than 1 Revision</b>				
Yes (%)	13 (12.3%)	8 (9.4%)	3 (18.8%)	2 (40%)
<b>Time to Revision (years)</b>				
Median (range)	8 (1-36)	8 (1-20)	12 (1-36)	6 (1-14)

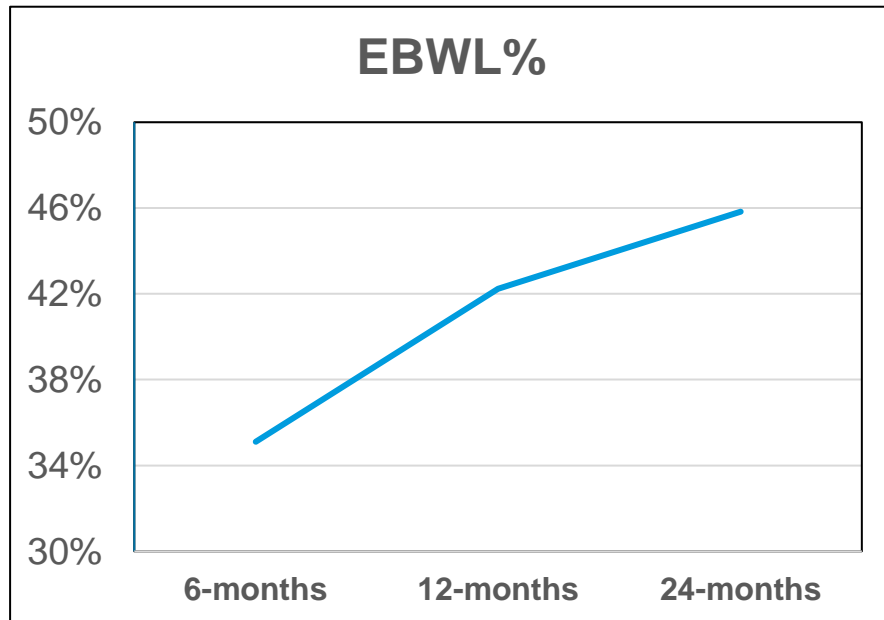
# Peri- and Post-operative Outcomes

- Main indication: **IWL (49%)**.
- Median Op time: **187 min**.
- **5 cases** required conversion to open.
- Median LOS: **2 days**.
- Early complications: 20 (18.9%) patients.
- Early readmissions: 9 (8.5%) patients.
- No leaks and no reoperations.

	Revisional Bariatric Surgery			
	Total (N = 106)	RYGB (N = 85)	Redo-GJ (N = 16)	DS (N = 5)
<b>Main Revision Indication</b>				
Insufficient Weight Loss	52 (49%)	46 (54.1%)	1 (6.3%)	5 (100%)
Dysphagia	14 (13.2%)	11 (12.9%)	3 (18.8%)	0 (0%)
Reflux	27 (25.5%)	24 (28.2%)	3 (18.8%)	0 (0%)
Malabsorption	1 (0.9%)	0 (0%)	1 (6.3%)	0 (0%)
Anatomical Complication	12 (11.3%)	4 (4.7%)	8 (50%)	0 (0%)
<b>Operative time (min)</b>				
Median (range)	187 (100-379)	185 (100-379)	216 (111-272)	161 (102-257)
<b>Estimated Blood Loss (ml)</b>				
Median (range)	25 (5-210)	25 (5-10)	30 (5-150)	25 (5-50)
<b>Length of Stay</b>				
Median (range)	2 (1-16)	2 (1-10)	2 (1-16)	2 (1-4)
<b>Conversion to Open</b>	5 (4.7%)	5 (5.9%)	0 (0%)	0 (0%)
<b>Early Complications (&lt;1 month)</b>				
Grade I	12 (11.3%)	12 (14.1%)	0 (0%)	0 (0%)
Grade II	4 (3.8%)	2 (2.4%)	2 (12.5%)	0 (0%)
Grade IIIa	1 (0.9%)	0 (0%)	1 (6.3%)	0 (0%)
Grade IIIb	3 (2.8%)	2 (2.4%)	1 (6.3%)	0 (0%)
Grade IV	0 (0%)	0 (0%)	0 (0%)	0 (0%)
<b>Early readmission (&lt;1 month)</b>	9 (8.5%)	8 (7.4%)	1 (6.3%)	0 (0%)

# Weight Loss Outcomes

- Median EBWL%:
  - 35.1% at 6-months
  - 42.23% at 12 months
  - 45.82% at 24-months



	Total	Revisional Bariatric Surgery		
		RYGB	Redo-GJ	DS
<b>6-month BMI (Kg/m<sup>2</sup>)</b>				
Median (range)	33.2 (18.81-62.15)	33.16 (20.35-62.15)	31.85 (18.81-42.76)	45.27 (43.21-46.78)
N	103	83	15	5
<b>6-month EBWL%</b>				
Median (range)	35.1% (-99.35-183.82)	37.32% (-53.42-98.4)	4.4% (-99.35-182.8)	33.65% (21.5-40.5)
<b>6-month TWL (Kg)</b>				
Median (range)	17.5 (-15.6-46.9)	18.1 (-12.5-46.9)	0.8 (-15.6-31)	32.1 (17.8-44.5)
<b>12-month BMI (Kg/m<sup>2</sup>)</b>				
Median (range)	31.6 (20.8-65.61)	31.62 (20.8-65.61)	30.9 (23.1-39.2)	39.86 (33.1-40.3)
N	85	68	13	4
<b>12-month EBWL%</b>				
Median (range)	42.23% (-157.79-160.4)	44.5% (-51.28-100.6)	1.54% (-157.8-160.4)	46.87% (37.29-70.9)
<b>12-month TWL (Kg)</b>				
Median (range)	19.6 (-24.3-84.9)	21.75 (-17-84.9)	-1.1 (-24.3-44.6)	47.45 (30.8-77.9)
<b>24-month BMI (Kg/m<sup>2</sup>)</b>				
Median (range)	31.6 (18.67-57.6)	31.6 (19.22-57.6)	31.05 (18.67-41.61)	36.13 (32.76-39.5)
N	68	53	11	2
<b>24-month EBWL%</b>				
Median (range)	45.82% (-93.5-245.1)	46.68% (-11-169.34)	8.6% (-93.5-245.1)	31.88% (-9.9-73.68)
<b>24-month TWL (Kg)</b>				
Median (range)	21.9 (-22.3-80.9)	24 (-5-59.8)	-6.5 (-22.3-53.5)	36.35 (-8.2-80.9)



# Comorbidities and Symptomatic Outcomes

	Revisional Bariatric Surgery			
	Total	RYGB	Redo-GJ	DS
<b>Reduction in HTN Medications (%)</b>	29/57 (50.9%)	26/47 (55.3%)	3/8 (37.5%)	0/2 (0%)
<b>Resolution of HTN (%)</b>	7/57 (12.3%)	6/47 (12.8%)	0/8 (0%)	1/2 (50%)
<b>Reduction in DM Medications (%)</b>	20/27 (74.1%)	19/25 (76%)	1/2 (50%)	0/0 (0%)
<b>Resolution of DM (%)</b>	12/27 (44.4%)	12/25 (48%)	0/2 (0%)	0 (0%)
<b>Improvement of Symptoms (No.)</b>	64/75 (85.3%)	48/57 (84.2%)	14/16 (87.5%)	2/2 (100%)
<b>Resolution of GERD (No.)</b>	56/86 (65.1%)	47/71 (66.2%)	6/12 (50%)	3/3 (100%)

# CONCLUSIONS

Robotic-assisted RBS is safe and has a minimal major adverse event rate. It also improves patients' symptoms and leads to significant weight loss.



## Weight Loss

- EBLW% at 12 months: **42.23%**
- EBLW% at 24 months: **45.82%**



## HTA

- **50.9%** reduced medication dosage
- **12.3%** resolved



## DM

- **74.1%** reduced medication dosage
- **44.4%** resolved



## Major adverse events

- 4 patients (3.7%)
- No leaks
- No reoperations

# QUESTIONS & ANSWERS

