Six-year Analysis of Laparoscopic Versus Robotic Sleeve Gastrectomy Outcomes: MBSAQIP database study

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Introduction

- Sleeve gastrectomy is a popular weight loss procedure
- It is predominantly performed via laparoscopy, although robotic techniques are gaining popularity
- This study compares robotic and laparoscopic sleeve gastrectomy in the MBSAQIP database.

Methods and Procedures

- We analyzed 692,380 cases in the MBSAQIP database (2016-2021) with CPT code 43775 for primary sleeve gastrectomy
- Excluded emergency, conversion, revisional, endoscopic, prior foregut surgery, and open cases
- Compared preoperative demographics, morbidity, and intraoperative details using chi-square and t-test and analyzed postoperative outcomes with multivariate logistic regression (STATA version 15)
- Serious morbidity was defined as a variable including any of the following organ space infection, wound disruption, ventilator dependence, acute kidney injury, progressive renal failure, cerebrovascular accident, cardiac arrest, myocardial infarction, transfusion requirement, pulmonary embolism, sepsis, septic shock, coma, bowel obstruction, or GI bleeding.

Results

- 600,779(86.76%) patients underwent laparoscopic sleeve gastrectomy(LSG), while 91,601(13.24%) underwent robotic sleeve gastrectomy(RSG)
- LSG had higher percentages of white patients, Hispanic patients and smokers
- RSG had higher percentages of non-white ethnicities and comorbidities (HTN, GERD, immunosuppression, sleep apnea)

Results

- RSG had significantly longer operative times, more mid-level provider assistance or no assistance and staple line over-sewing
- LSG cases showed significantly lower odds of serious post-op morbidity (OR: 0.82 (0.77-0.88); p < 0.01), surgical site infection (OR: 0.8 (0.72-0.88); p < 0.01) and transfusion requirement (OR 0.8 (0.73-0.88); p < 0.01)
- The LSG group had higher odds of unplanned ICU admission (OR: 1.2 (1.07-1.33); p < 0.01), hospital stay > 2 days (OR: 1.24 (1.20-1.28); p < 0.01)
- The two groups had no significant differences in 30-day mortality and leak rate.

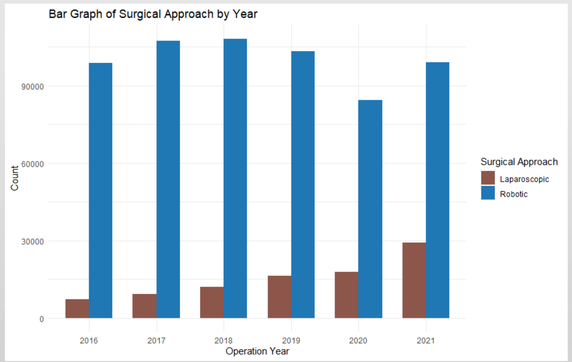


Fig.1 Yearly trend of Robotic vs Laparoscopic SG

Preoperative variables	Robotic Sleeve Gastrectomy (n= 91,601)	Laparoscopic Sleeve Gastrectomy (n = 600,779)	P-value
Age (Mean +/- SD)	43.5 +/- 11.9	43.6 +/- 12	1
Sex			**<0.01**
Male	17,619(19.23%)	120,121(19.99%)	
Female	73,982(80.77%)	480,658(80.01%)	
Race			**<0.01**
White	59,703(65.23%)	410,490 (68.36%)	
Black	21,698(23.71%)	120,110(20.00%)	
Others	2,092(2.29%)	11,306(1.88%)	
Unknown	8,032(8.78%)	58,592(9.76%)	
Ethnicity			**<0.01**
Hispanic	12,544(13.69%)	88,199(14.68%)	
Non-Hispanic	70,762(77.25%)	457,988(76.23%)	
Unknown	8,295(9.06%)	54,592(9.09%)	
ASA Score			**<0.01**
1	438(0.48%)	4,770(0.79%)	
2 – 3	87,606(95.64%)	576,664(95.99%)	
4 or 5	3,557(3.88%)	19,345(3.22%)	
BMI (mean, SD)	44.98456(8.54)	44.72788(8.21)	**<0.01**
Hypertension	41,459(45.26%)	266,414(44.34%)	**<0.01**
Hyperlipidemia	19,838(21.66%)	126,177(21.00%)	**<0.01**
GERD	24,959(27.25%)	157,473(26.21%)	**<0.01**
Smoking	6,818(7.44%)	48,243(8.03%)	**<0.01**
COPD	1,215(1.44%)	6,269(1.25%)	**<0.01**
Diabetes Mellitus	20,453(22.33%)	132,169(22.00%)	**0.03**
On Hemodialysis	422(0.46%)	2,126(0.35%)	**<0.01**
Immunosuppression	1,985(2.17%)	11,525(1.92%)	**<0.01**
History of PE	1,125(1.23%)	6,973(1.16%)	0.08
History of DVT	1,430(1.56%)	9,231(1.54%)	0.6
On anticoagulant	2,621(2.86%)	16,376(2.73%)	**0.02**
Venous stasis	590(0.64%)	4,917(0.82%)	**<0.01**
Sleep Apnea	33,054(36.08%)	214,476(35.70%)	**0.02**
Functional Status			**<0.01**
Independent	90,752(99.13%)	595,953(99.26%)	
Partially dependent	512(0.56%)	3,179 (0.53%)	
Totally Dependent	287(0.31%)	1,281(0.21%)	
Surgeon Specialty			**<0.01**
Bariatric Surgeon	88,851(97.00%)	589,425(98.11%)	
General Surgeon	2,737(2.99%)	11,244(1.87%)	
Others	13(0.01%)	110(0.02%)	
Op length (mean, SD)	90.88455(40.11)	67.27472(33.93)	**<0.01**
Drain Placed	5,822(6.36%)	60,301(10.04%)	**<0.01**
Anastomosis Checked	63,655(69.49%)	419,128(69.76%)	0.1
Assistant			**<0.01**
Attending (Bariatric/Other)	5,481(12.25%)	88,584(21.22%)	
Resident/Fellow	11,879(26.55%)	108,439(25.98%)	
NP/PA/RN	18,367(41.05%)	157,557(37.74%)	
None	9,014(20.15%)	62,852(15.06%)	
Staple line reinforcement	24,593(54.97%)	273,919(65.62%)	**<0.01**
Oversew	10,752(24.03%)	83,252(19.94%)	**<0.01**
Swallow eval	15,142(33.84%)	128,898(30.88%)	**<0.01**

Table 1. LSG vs RSG preoperative and intraoperative variables

Outcome	Laparoscopic	Robotic	Odds ratio	95% confidence interval	P-value
Serious morbidity	5,525(0.92%)	1,145(1.25%)	0.82	0.77-0.88	**<0.01**
Acute renal failure	256(0.04%)	43(0.05%)	1.03	0.74-1.44	0.834
Unplanned ICU admission	2,717(0.45%)	409(0.45%)	1.20	1.07-1.33	**<0.01**
Post op anastomotic leak	1,361(0.23%)	214(0.23%)	0.89	0.77-1	0.157
Unplanned Intubation	477(0.08%)	92(0.10%)	0.98	0.78-1.23	0.872
Post op pneumonia	684(0.11%)	134(0.15%)	0.87	0.71-1.04	0.139
Pulmonary embolism	521(0.09%)	102(0.11%)	0.91	0.73-1.14	0.442
DVT requiring anticoagulation	1,217(0.20%)	192(0.21%)	1.006	0.86-1.18	0.935
Superficial surgical site infection	1,356(0.23%)	258(0.28%)	0.92	0.80-1.05	0.233
Deep surgical site infection	139(0.02%)	32(0.03%)	0.75	0.50-1.12	0.166
Organ space infection	892(0.15%)	221(0.24%)	0.69	0.59-0.80	**<0.01**
Wound disruption	228(0.04%)	56(0.06%)	0.71	0.52-0.96	**0.03**
Sepsis	391(0.07%)	90(0.10%)	0.78	0.62-0.99	**0.05**
Urinary tract infection	1,734(0.29%)	254(0.28%)	1.13	0.99-1.30	0.061
Transfusion requirement	2,879(0.48%)	570(0.62%)	0.80	0.73-0.88	**<0.01**
Reoperation	4,375(0.73%)	689(0.75%)	1.06	0.98-1.16	0.121
Readmission	15,504(2.58%)	2,580(2.82%)	1.01	0.96-1.05	0.602
30-day intervention	3,764(0.63)	607(0.66)	1.06	0.97-1.16	0.18
Cardiac Arrest	182(0.03%)	33(0.04%)	0.93	0.64-1.37	0.736
Dehydration outpatient management	21,941(3.65%)	2,868(3.13%)	1.22	1.17-1.27	**<0.01**
Emergency room visit	37,894(6.31%)	6,271(6.85%)	0.97	0.94-0.99	**0.03**
Stay greater than 2 days	37,192(6.19%)	5,532(6.04%)	1.24	1.20-1.28	**<0.01**
30-day mortality	263(0.06%)	27(0.06%)	1.16	0.78-1.75	0.458
Incisional Hernia	330(0.08%)	34(0.08%)	1.31	0.92-1.90	0.132
Drain present in 30 day post op	419(0.10%)	45(0.10%)	1.05	0.77-1.45	0.725
GI bleed	346(0.19%)	124(0.26%)	0.77	0.62-0.95	**0.02**
Bowel obstruction	61(0.03%)	19(0.04%)	1.24	0.72-2.14	0.435

Table 2. Odds of 30- day post op outcomes in RSG vs LSG

Discussion

- Robotic group had longer operative times, more leak and infection complications in the 2015 and 2016 MBSAQIP registry analysis (1,2,5,7)
- The robotic approach showed significant reduction of postoperative bleeding and strictures in the 2015-2016 MBSAQIP registry analysis(2)
- Ho K et.al. reported no significant difference in postoperative outcomes when comparing the approaches after adjusting operation time, except a lower reoperation rate for robotic group (3)
- El Char et.al. reported higher transfusion requirement in the robotic group with no differences in other 30-day outcomes. (5)
- Dudash et.al. reported higher length of stay and re-admission in robotic group (6)
- Tatarian et.al. reported increased utilization of robotic platform in recent years with improved outcomes in both RSG and LSG (7)
- Our MBSAQIP analysis gives an up-to-date comparison of LSG vs RSG 30-day outcomes.

Conclusion

Based on our up-to-date robust analysis of the MBSAQIP registry robotic sleeve gastrectomy patients exhibit higher serious postoperative morbidity and infectious complications, but shorter hospital stays and less need for intraoperative assistants.

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Disclosures

The American College of Surgeons Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program and the centers participating in the ACS MBSAQIP are the source of the data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors.

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