Single-Fire Stapler Sleeve Gastrectomy Results In Less Nausea and Shorter Hospital Stay

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Introduction

Sleeve gastrectomy has traditionally been created using multiple sequential linear stapler fires. This technique creates significant variability in the shape of the sleeve and introduces potential twisting in the sleeve if each sequential firing is not appropriately aligned with the previous one. Performing the sleeve gastrectomy using a 23-cm single-fire stapler may create a straight and reproducible gastric sleeve. We compare early outcomes of sleeve gastrectomy using single staple-fire (SS) versus multiple staple fires (MS).



Titan SGS™ Stapler



Echelon™ 60-mm Powered Stapler



SureForm™ 60-mm Robotic Stapler

Methods

We retrospectively reviewed all patients undergoing sleeve gastrectomy at our institution from January 2022 to April 2024. Patients were identified using our Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database.

All sequential firings were performed using Echelon™ 60-mm powered stapler (Ethicon Biosurgery, Inc., Somerville, NJ, USA) or SureForm™ 60-mm robotic stapler (Intuitive Surgical, Inc., Sunnyvale, CA, USA). Single firing was performed laparoscopically and robotically using Titan SGS™ stapler (Standard Bariatrics, Inc., Cincinnati, OH, USA).

Demographics, perioperative data, operative data, and post-operative course were extracted from the database. Postoperative pain and antiemetic medication requirements were obtained from chart review. We compared outcomes between groups using t-test for continuous data and Chi-square or Fischer's exact test for categorical data; statistical significance was set at p=0.05.

Table 1. Demographics, patient characteristics

		MS (n = 148)	SS (n = 80)	p-value
Mean Age (years)		42.8	43.0	0.889
Sex	Female	120	66	0.859
	Male	28	14	
Race	Black/African American	42	32	0.333
	White	59	27	
	Asian	3	2	
	Other/Not Reported	44	19	
Mean Pre-op BMI		44.6	44.4	0.897
Procedure Type	Laparoscopic	136	27	**0.0001****
	Robotic	12	53	
ASA classification	I (Normal/Healthy)	1	1	0.372
	II (Mild Systemic Disease)	27	13	
	III (Severe Systemic Disease)	119	63	
	IV (Severe Systemic Disease threat to life)	1	3	
Co-morbidities	Hypertension	49	29	0.735
	Diabetes	24	9	
	GERD	12	5	
	Sleep Apnea	28	16	
Insurance	Private	110	65	0.255
	Medicaid/Medicare	38	15	
Mean length of Procedure (mins)		83.2	80.5	0.84

MS = Multiple Staple Fires; SS = Single Staple Fire; BMI = Body Mass Index; GERD = Gastroesophageal Reflux Disease

**p <0.05

Table 2. Outcomes of single–fire staple versus multiple fire staples

		MS (n = 148)	SS (n = 80)	p-value
Mean Length of Stay (days)		1.57	1.31	**0.029****
POD 0	Average Dose of antiemetic	1.53	1.11	**0.026****
	Average OME	55.66	43.21	**0.0059****
POD 1	Average Dose of antiemetic	1.58	0.63	**0.0001****
	Average OME	32.50	20.10	**0.0015****
Emergency Department Visits (%)		0.095	0.075	0.463
Unplanned Readmissions within 30 days (%)		0.03	0	0.165

MS = Multiple Staple Fires; SS = Single Staple Fire; POD = Post-Operative Day; OME = Oral Morphine Equivalents

**p <0.05

Results

228 patients were identified, with 148 patients in MS group and 80 patients in SS group.

Average age was 42.8 years (MS) and 43.0 years (SS) [p=0.889]. Preoperative BMI was 44.6 (MS) and 44.4 (SS) [p = 0.897]. There was no statistical difference in average procedure length [83.2 mins (MS) vs 80.5 mins (SS) [p = 0.840]. There were also no differences between the groups in regard to sex, race, ASA classification, co-morbidites and insurance type. Patients in the MS group were more likely to have their sleeve gastrectomy performed laparoscopically (Table 1).

SS patients had statistically significant shorter length of hospital stay [1.57 days (MS) vs 1.31 days (SS), p= 0.029]. SS patients also had statistically significantly lower oral morphine equivalents on POD 0 [55.66 vs 43.21, p=0.0059] and POD 1 [32.50 vs 20.10, p= 0.0015] as well as fewer anti-emetic doses on POD 0 [1.53 vs 1.11, p=0.026] and POD 1 [1.58 vs 0.63, p=0.0001]. There was no difference in 30-day readmission [0.03% vs 0%, p=0.165] or Emergency Department visits [0.085% vs 0.075%, p= 0.463](Table 2).

There were no reports of staple line leaks, surgical site infections, pulmonary embolism, deep vein thrombosis or acute renal insufficiency in either group.

Conclusions

Patients undergoing single staple-fire sleeve gastrectomy have less postoperative pain and nausea and shorter length of stay as compared to those undergoing traditional sleeve gastrectomy with multiple sequential staple-fire, with no difference in short-term complications or re-admissions.

References

"Echelon Flex GST System" Ethicon. 2020 Mar 26. https://www.ethicon.com/na/epc/code/psee60a?lang=en-default, accessed 2025 Mar 1

Seeras K, Sankararaman S, Lopez PP. Sleeve Gastrectomy. [Updated 2023 Jan 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK519035/

Salyer CE, Thompson J, Hoffman A, et al. Multisite study of Titan SGS stapler in longitudinal gastric resection. *Surg Endosc*. 2022;36(8):6285-6292. doi:10.1007/s00464-022-09051-x

"SureForm 60 With SmartFire technology" DaVinci. 2018 July. https://www.intuitive.com/en-gb/-/media/ISI/Intuitive/Pdf/davinci-sureform-60-brochure-uk-1049874.pdf, accessed 2025 Mar 1