

Supplementary material

APPENDIX

Appendix to: Krishnamoorthi R, Bomman S, Benias P, et al. Efficacy and safety of endoscopic duodenal stent versus endoscopic or surgical gastrojejunostomy to treat malignant gastric outlet obstruction: systematic review and meta-analysis

eTable 1. Search strategy.

Database Used: Embase and MEDLINE (via Embase.com) January 2015 to February 16, 2021

Accessed: February 17, 2021

No.	Query
#13	#9 OR #11 OR #12
#12	#11 NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim OR [data papers]/lim OR [editorial]/lim OR [erratum]/lim OR [letter]/lim OR [note]/lim OR [short survey]/lim OR 'case report'/de)
#11	'axios' AND ('boston scientific' OR 'boston sci' OR bsci OR bsc) AND [english]/lim AND [humans]/lim AND ([clinical study]/lim OR 'systematic review*:ti) AND [2-7-2020]/sd NOT [17-2-2021]/sd
#10	#7 NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim OR [data papers]/lim OR [editorial]/lim OR [erratum]/lim OR [letter]/lim OR [note]/lim OR [short survey]/lim OR 'case report'/de)
#9	#8 NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim OR [data papers]/lim OR [editorial]/lim OR [erratum]/lim OR [letter]/lim OR [note]/lim OR [short survey]/lim OR 'case report'/de)
#8	(#1 OR #2) AND [english]/lim AND [humans]/lim AND ([clinical study]/lim OR 'systematic review*:ti) AND [2-7-2020]/sd NOT [17-2-2021]/sd
#7	(#5 OR #6) AND [english]/lim AND [humans]/lim AND ([clinical study]/lim OR 'systematic review*:ti) AND [2-7-2020]/sd NOT [17-2-2021]/sd
#6	#3 AND axios AND ('boston scientific' OR 'boston sci' OR bsci OR bsc)
#5	(#1 OR #2) AND axios AND ('boston scientific' OR 'boston sci' OR bsci OR bsc)
#4	#1 OR #2
#3	('endoscopic gastrojejunostomy' OR ('bypass surgery' NEAR/5 'gastric outlet obstruction')) AND [english]/lim AND [humans]/lim AND ([clinical study]/lim OR 'systematic review*:ti) AND [2-7-2020]/sd NOT [17-2-2021]/sd
#2	('malignant gastric outlet obstruction' OR ('gastric outlet obstruction' NEAR/10 malignant) OR 'malignant gastroduodenal obstruction' OR 'malignant duodenal obstruction' OR 'malignant pyloric obstruction' OR ('gastric outlet obstruction' NEAR/10 benign) OR 'benign gastric outlet obstruction') AND [english]/lim AND [humans]/lim AND ([clinical study]/lim OR 'systematic review*:ti) AND [2-7-2020]/sd NOT [17-2-2021]/sd
#1	('lumen apposing metal stent*' OR 'lumen apposing metallic stent*' OR 'lumen apposing stent*' OR ('self expandable metallic stent*' NEAR/5 duodenal) OR ('self expandable metal stent*' NEAR/5 duodenal)) AND [english]/lim AND [humans]/lim AND ([clinical study]/lim OR 'systematic review*:ti) AND [2-7-2020]/sd NOT [17-2-2021]/sd

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eTable 2. Assessment of methodologic quality of studies utilizing a modified Newcastle-Ottawa Scale.**Modified Newcastle-Ottawa Scale questions**

1. Did the patient(s) represent the whole case(s) of the medical center? Cases included represented the general population of gastric outlet obstruction
2. Was the diagnosis correctly made? Were only malignant patients included?
3. Was follow-up long enough for outcomes to occur? Reported adequate follow-up time.
4. Were all important data cited in the report? Reported clinical success and at least 2 outcomes (NR = did not define "clinical success," but study could still score a "Yes" if they reported (undefined) clinical success rate)
5. Was the outcome correctly ascertained? Provided definition of clinical success.

Study	Year	Question 1		Question 2		Question 3		Question 4		Question 5		Methodologic Quality
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Chiu ¹	2015	X		X		X		X		X		Good
JW Kim ²	2015	X		X		X		X		X		Good
SH Kim ³	2015	X		X		X		X		X		Good
H Lee ⁴	2015		X (gastric cancer only)	X		X		X		X		Moderate
JE Lee ⁵	2015	X		X		X		X		X		Good
D Oh ⁶	2015	X		X		X		X		X		Good
SY Oh ⁷	2015	X		X		X		X		X		Good
Park ⁸	2015		X (gastric cancer only)	X		X		X		X		Moderate
Sato ⁹	2015	X		X		X		X			NR	Moderate
Trotter ¹⁰	2015	X		X		X		X		X		Good
Fiori ¹¹	2016		X (metastatic adenocarcinoma of antropyloric region only)	X		X		X			NR	Poor
Grunwald ¹²	2016	X		X		X		X		X		Good
Itoi ¹³	2016	X		X		X			X (few AEs specified)		NR	Poor
Jung ¹⁴	2016	X		X		X		X		X		Good
Kato ¹⁵	2016	X		X		X		X		X		Good
Khan ¹⁶	2016	X		X		X		X (barely)		X		Good
Kobayashi ¹⁷	2016		X (pancreatic cancer only)	X		X		X		X		Moderate
Lye ¹⁸	2016	X		X		X		X		X		Good
Okuwaki ¹⁹	2016		X (advanced pancreatic	X		X		X		X		Moderate

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Study	Year	Question 1		Question 2		Question 3		Question 4		Question 5		Methodologic Quality
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
			cancer or advanced biliary cancer only)									
J-H Park (1) ²⁰	2016	X		X		X		X			NR	Moderate
J-H Park (2) ²¹	2016		X (gastric cancer only)	X		X		X		X		Moderate
Rademacher ²²	2016	X		X		X		X		X		Good
Sasaki ²³	2016	X		X		X		X		X		Good
Shin ²⁴	2016	X		X		X		X		X		Good
Tsauo ²⁵	2016		X (pancreatic cancer only)	X		X		X		X		Moderate
Yamao ²⁶	2016	X		X		X		X		X		Good
Bulut ²⁷	2017	X		X		X		X		X		Good
Chen ²⁸	2017	X		X		X		X		X		Good
Hori ²⁹	2017	X		X		X		X		X		Good
Jang ³⁰	2017		X (gastric cancer only)	X			X (patients excluded for follow-up < 1 month)	X		X		Poor
Khashab ³¹	2017	X		X		X		X		X		Good
Kim ³²	2017		X (periampullary ca only)	X		X		X		X		Moderate
Ojima ³³	2017		X (gastric cancer only)	X		X		X			NR	Poor
Perez-Miranda ³⁴	2017	X			X	X		X		X		Moderate
Takahara ³⁵	2017	X		X		X		X		X		Good
Tanaka ³⁶	2017		X (gastric cancer only)	X		X		X			NR	Poor
Tsauo ³⁷	2017	X		X		X		X		X		Good
Ye ³⁸	2017	X		X		X		X		X		Good
Yoshida ³⁹	2017		X (pancreatic cancer only)	X		X		X		X		Moderate
Bekheet ⁴⁰	2018	X		X		X		X		X		Good
Choi ⁴¹	2018	X		X		X		X		X		Good
Leiyuan ⁴²	2018	X		X		X		X			NR	Moderate
Uemura ⁴³	2018		X (pancreatic cancer only)	X		X		X		X		Moderate
Yukimoto ⁴⁴	2018	X		X			NR	X		X		Moderate
Ge ⁴⁵	2019	X		X		X		X		X		Good
Jang ⁴⁶	2019	X		X		X		X		X		Good

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Study	Year	Question 1		Question 2		Question 3		Question 4		Question 5		Methodologic Quality
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Kerdsirichairat ⁴⁷	2019	X		X				X		X		Good
Kumar ⁴⁸	2019	X		X		X		X		X		Good
Ramos ⁴⁹	2019		X (gastric cancer only)	X		X		X			NR	Poor
Ratone ⁵⁰	2019	X		X		X		X		X		Good
Sterpetti ⁵¹	2019	X		X		X		X			NR	Moderate
Alcala-Gonzalez ⁵²	2020	X		X		X		X		X		Good
Kastelijn ⁵³	2020	X		X		X		X		X		Good
Miwa ⁵⁴	2020	X		X		X		X		X		Good
Mo ⁵⁵	2020	X		X		X		X		X		Good
Wu ⁵⁶	2020	X		X		X		X		X		Good
Xu ⁵⁷	2020	X		X		X		X		X		Good
Yildirim ⁵⁸	2020	X		X		X		X			NR	Moderate
Hindryckx ⁵⁹	2021	X			X	X		X		X		Moderate
Kouanda ⁶⁰	2021	X		X		X		X		X		Good
Yamao ⁶¹	2021	X		X		X		X		X		Good

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eTable 3. Analysis of heterogeneity by outcome and procedure in all studies.

Procedure	Outcome	# of Studies	# of Patients	I ² (95% CI)
Duodenal SEMS	Technical success	45	4413	65.6% (52.9% to 74.8%)
EUS-GJ	Technical success	8	245	67.4% (31.4% to 84.5%)
Surgical GJ	Technical success	13	564	0.0% (0.0% to 16.4%)
Duodenal SEMS	Clinical success	45	4590	79.3% (72.7% to 84.2%)
EUS-GJ	Clinical success	8	245	54.6% (0.0% to 79.5%)
Surgical GJ	Clinical success	13	588	77.6% (62.1% to 86.8%)
Duodenal SEMS	Preprocedural GOOSS score	27	2655	97.0% (96.3% to 97.5%)
EUS-GJ	Preprocedural GOOSS score	2	65	0.0% (., .)
Surgical GJ	Preprocedural GOOSS score	6	215	67.7% (23.3% to 86.4%)
Duodenal SEMS	Postprocedural GOOSS score	19	2184	95.8% (94.6% to 96.8%)
EUS-GJ	Postprocedural GOOSS score	2	59	95.1% (85.5% to 98.4%)
Surgical GJ	Postprocedural GOOSS score	5	180	99.0% (98.5% to 99.3%)
Duodenal SEMS	Recurrence of GOO	11	573	83.4% (71.8% to 90.3%)
EUS-GJ	Recurrence of GOO	1	25	---
Surgical GJ	Recurrence of GOO	8	342	48.6% (0.0% to 77.1%)
Duodenal SEMS	Reintervention	33	2963	81.3% (74.4% to 86.3%)
EUS-GJ	Reintervention	4	129	44.3% (0.0% to 81.4%)
Surgical GJ	Reintervention	9	418	75.3% (52.5% to 87.2%)
Duodenal SEMS	Procedure Related Complications	43	4285	91.6% (89.6% to 93.2%)
EUS-GJ	Procedure Related Complications	6	189	0.0% (0.0% to 65.4%)
Surgical GJ	Procedure Related Complications	16	746	67.0% (44.3% to 80.5%)
Duodenal SEMS	Bleeding	25	2854	65.1% (46.7% to 77.2%)
EUS-GJ	Bleeding	4	141	57.0% (0.0% to 85.7%)
Surgical GJ	Bleeding	9	412	0.0% (0.0% to 16.7%)
Duodenal SEMS	Perforation	24	2823	21.1% (0.0% to 52.2%)
EUS-GJ	Perforation	3	105	65.7% (0.0% to 90.1%)
Surgical GJ	Perforation	3	170	47.5% (0.0% to 84.6%)
Duodenal SEMS	Stent migration	33	3451	60.7% (42.6% to 73.1%)
EUS-GJ	Stent migration	4	116	69.6% (12.4% to 89.4%)
Duodenal SEMS	Stent occlusion	22	1993	92.2% (89.5% to 94.2%)
EUS-GJ	Stent occlusion	3	69	22.6% (0.0% to 92.0%)
Duodenal SEMS	Tissue ingrowth	22	2172	85.7% (79.7% to 90.0%)
EUS-GJ	Tissue ingrowth	1	24	---
Duodenal SEMS	Stent patency	3	140	0.0% (0.0% to 87.6%)
Duodenal SEMS	Tissue overgrowth	20	1962	45.4% (7.8% to 67.7%)
Surgical GJ	Laparoscopic complication	5	196	76.8% (43.8% to 90.5%)
Duodenal SEMS	Deaths reported in AE section	26	2151	70.8% (56.6% to 80.4%)
EUS-GJ	Deaths reported in AE section	4	151	76.5% (35.7% to 91.4%)
Surgical GJ	Deaths reported in AE section	8	421	54.6% (0.0% to 79.5%)

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SEMS self-expanding metal stent EUS-GJ endoscopic ultrasound-guided gastrojejunostomy
GOO gastric outlet obstruction GOOSS Gastric Outlet Obstruction Scoring System AE adverse event

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eTable 4. Publication bias testing

Outcome	Rank correlation test of funnel plot asymmetry [Begg and Mazumdar]			Rank correlation test of funnel plot asymmetry (with continuity correction) [Begg and Mazumdar]			Linear regression test of funnel plot asymmetry [Eggers]		
	Duodenal SEMS	EUS-GJ	Surgical GJ	Duodenal SEMS	EUS-GJ	Surgical GJ	Duodenal SEMS	EUS-GJ	Surgical GJ
Technical success	0.0869	0.7084	0.0016	0.0887	0.8031	0.0020	0.6243	0.4396	0.0051
Clinical success	0.7394	0.1051	0.9513	0.7468	0.1346	1.0000	0.5886	0.1681	0.5438
Preprocedural GOOSS score	0.5455	3.0000	0.3476	0.5594	3.0000	0.4524	0.0006	3.0000	0.3233
Postprocedural GOOSS score	0.1955	3.0000	0.6242	0.2079	3.0000	0.8065	0.0517	3.0000	0.5875
Recurrence of GOO	0.4835	3.0000	0.8046	0.5334	3.0000	0.9015	0.6230	3.0000	0.5985
Reintervention	0.1453	0.4969	0.1707	0.1496	0.7341	0.2060	0.1658	0.4270	0.0918
Procedural complications	0.3460	0.0195	0.0701	0.3514	0.0323	0.0774	0.6682	0.0671	0.0739
Bleeding	0.3382	0.7180	0.8348	0.3501	1.0000	0.9170	0.0626	0.5224	0.1233
Perforation	0.4560	0.1172	0.6015	0.4712	0.2963	1.0000	0.9056	0.0992	0.8675
Stent migration	0.7683	0.2786	---	0.7801	0.4701	---	0.8298	0.0709	---
Stent occlusion	0.5726	0.6015	---	0.5920	1.0000	---	0.8978	0.5684	---
Tissue ingrowth	0.2587	3.0000	---	0.2708	3.0000	---	0.1399	3.0000	---
Stent patency	0.1172	---	---	0.2963	---	---	0.2048	---	---
Tissue overgrowth	0.0349	---	---	0.0378	---	---	0.0445	---	---
Laparoscopic complication	---	---	0.6242	---	---	0.8065	---	---	0.6699
Deaths reported in AE section	0.1280	1.0000	1.0000	0.1336	1.0000	1.0000	0.8817	0.7039	0.7236

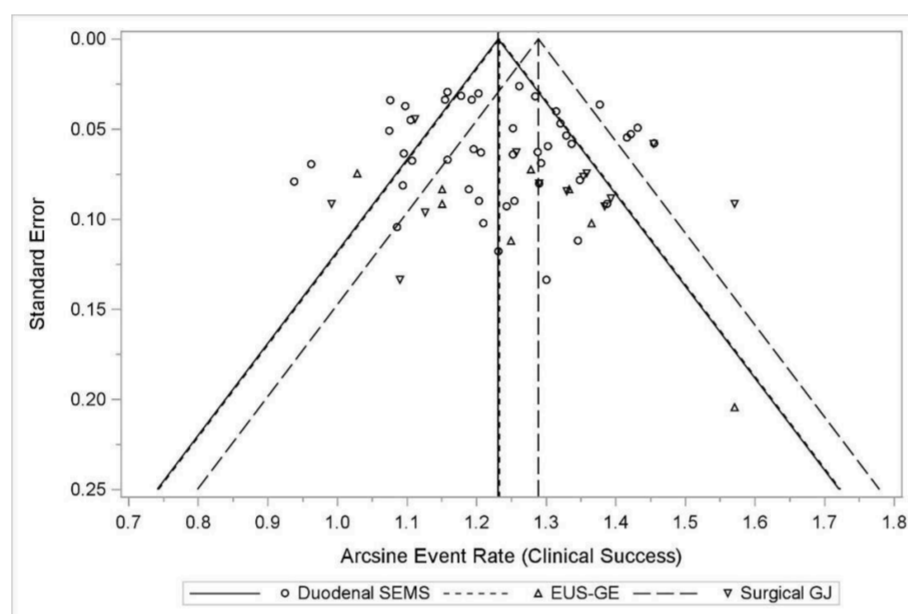
All numbers are p-values from the rank correlation or linear regression tests for funnel plot symmetry.

* - the test could not be conducted for the EUS-GJ studies because only 1 study was available.

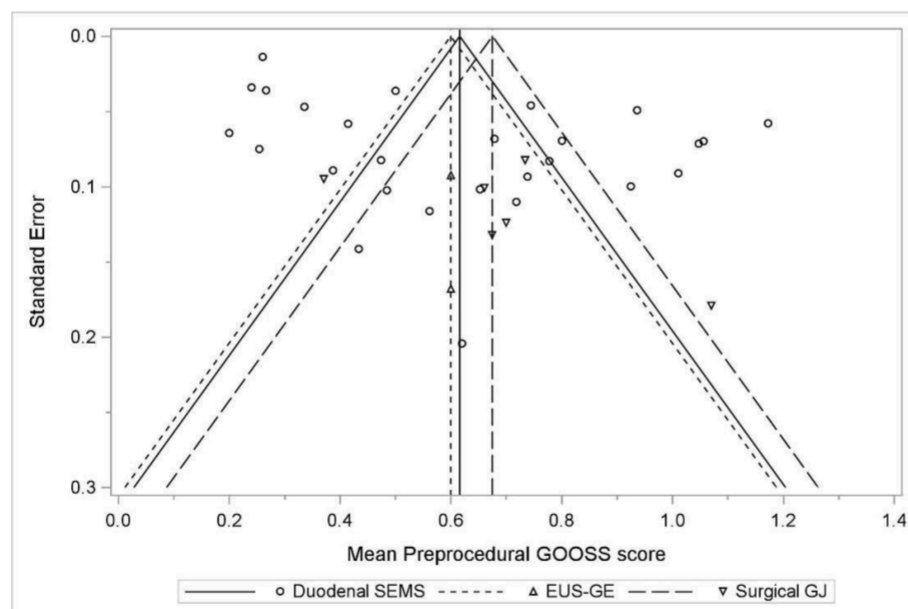
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eFigure 1. Funnel plots for studies of duodenal SEMS compared to EUS-GJ and surgical GJ: efficacy outcomes: (A) clinical success, (B) preprocedural GOOSS score, (C) postprocedural GOOSS score, (D) recurrence of GOO, and (E) reintervention; safety outcomes: (F) bleeding (G) perforation, (H) stent migration, (I) stent occlusion, (J) tissue ingrowth, (K) stent patency, (L) tissue overgrowth, (M) deaths reported in AE section

A. Clinical success

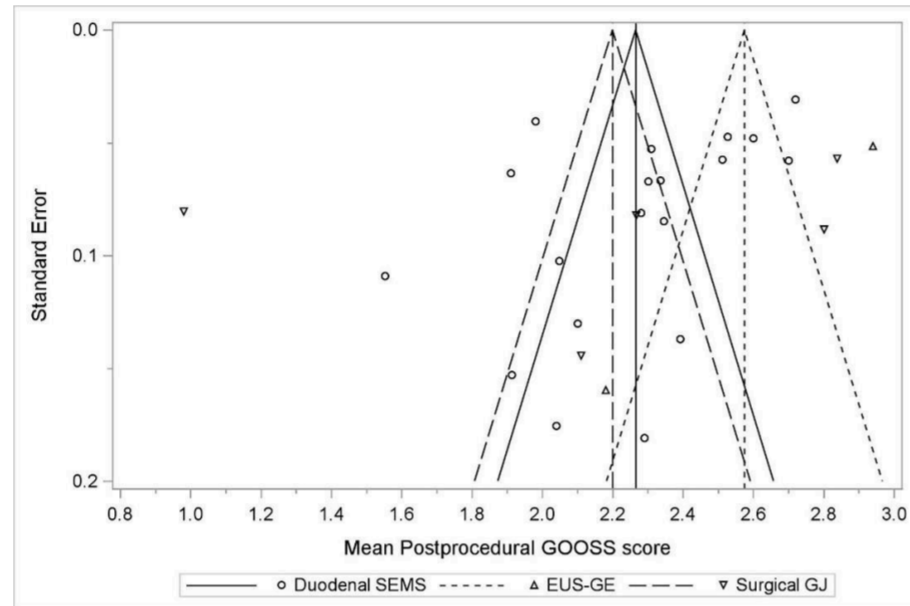


B. Preprocedural GOOSS score

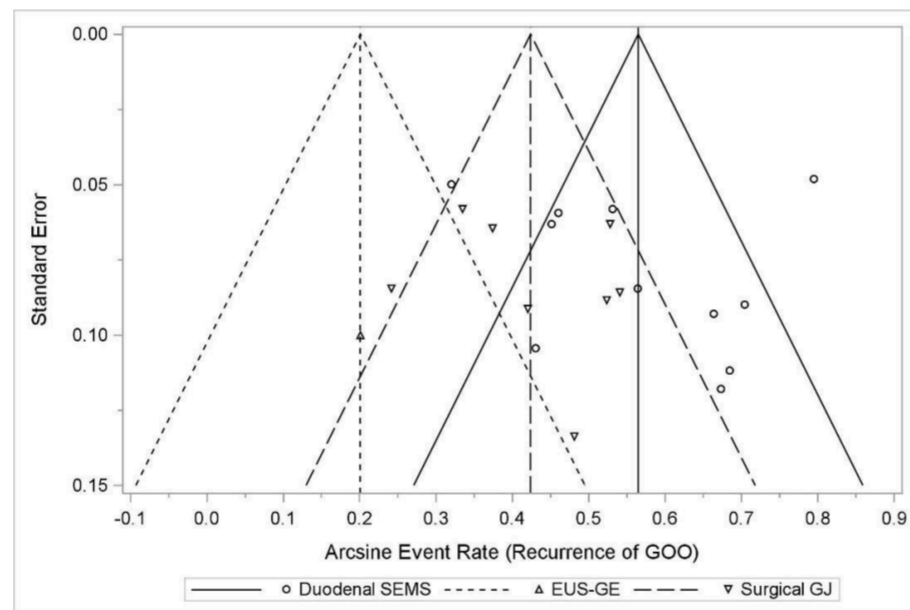


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C. Postprocedural GOOSS score

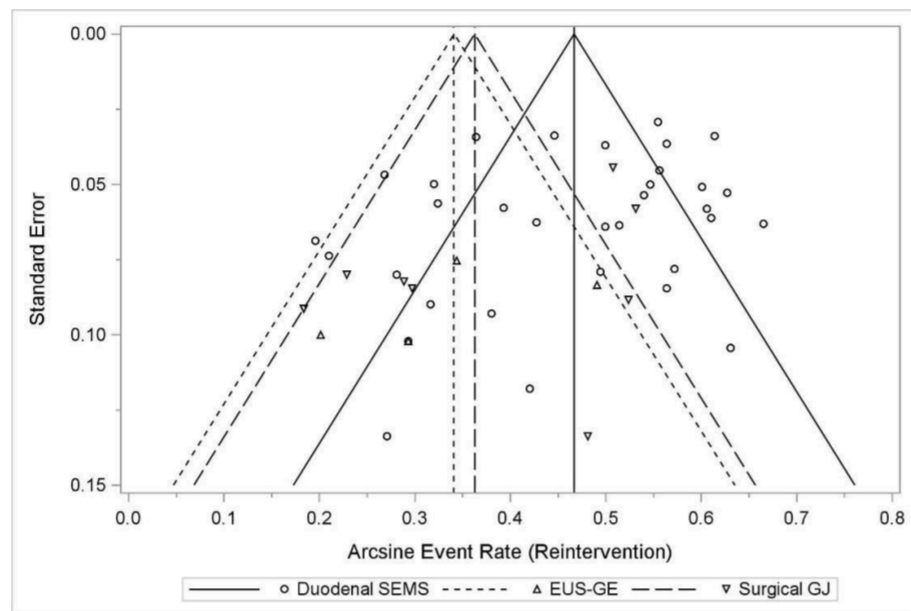


D. Recurrence of GOO

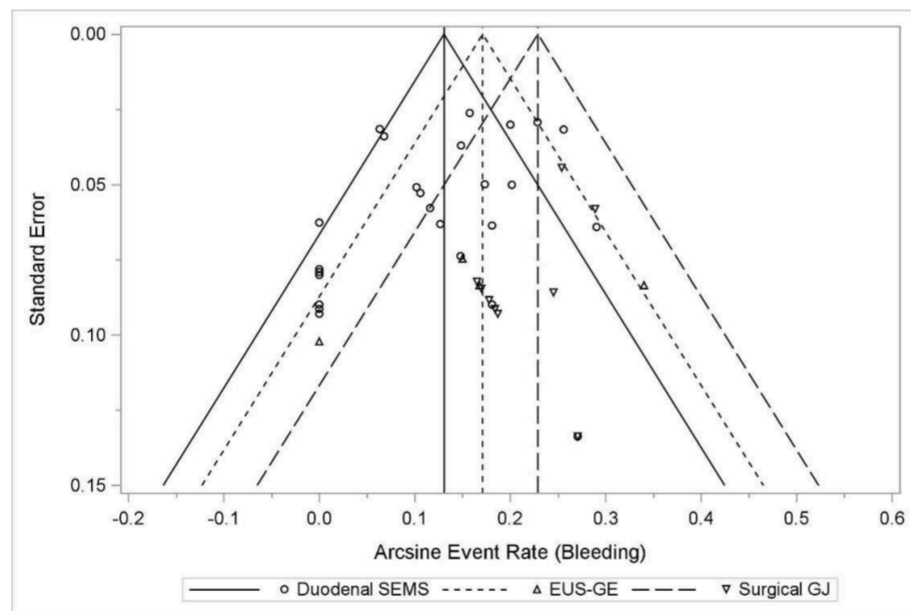


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E. Reintervention

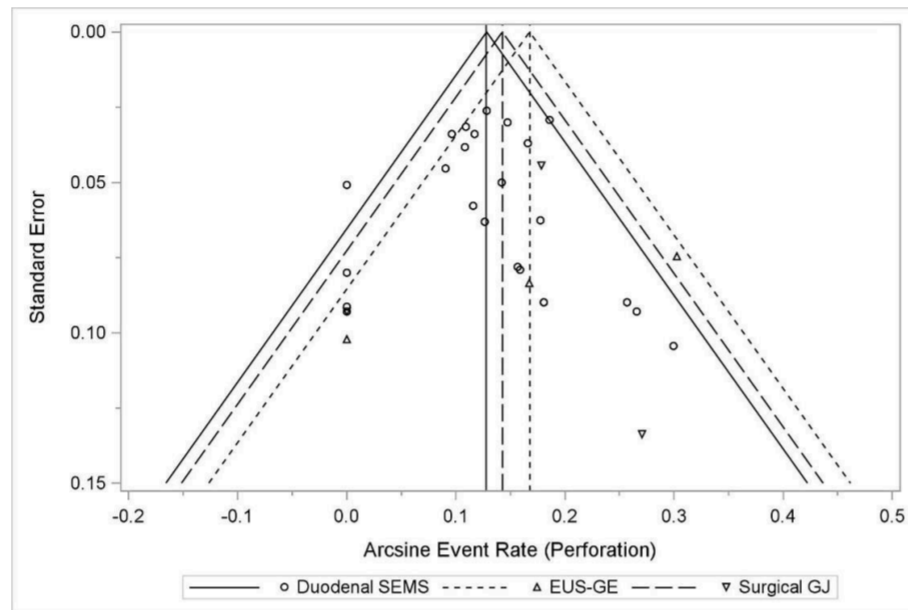


F. Bleeding

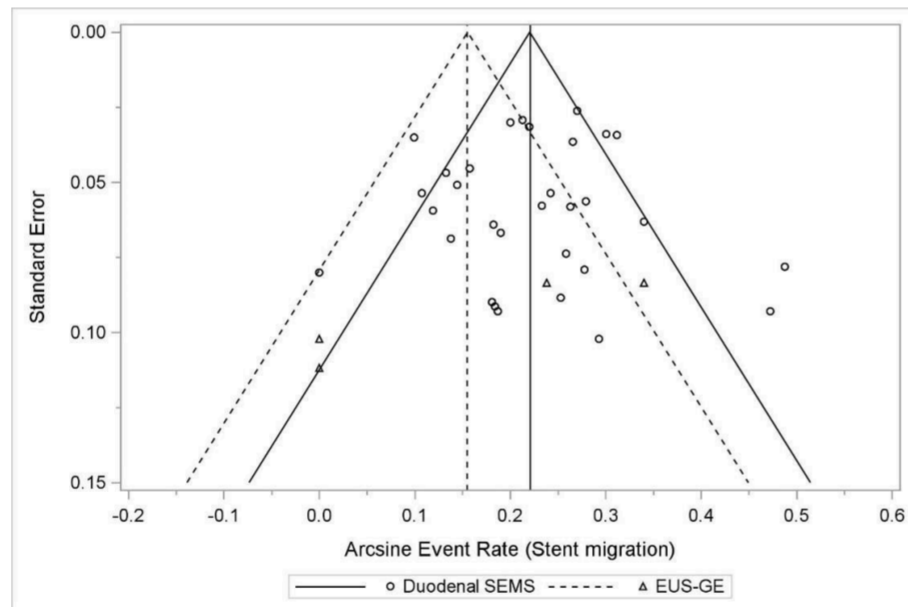


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G. Perforation

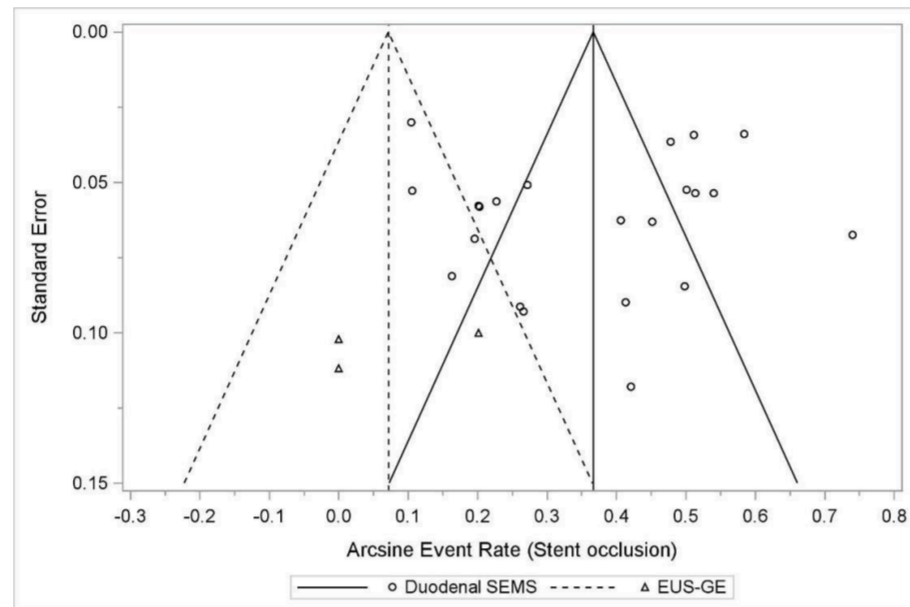


H. Stent migration

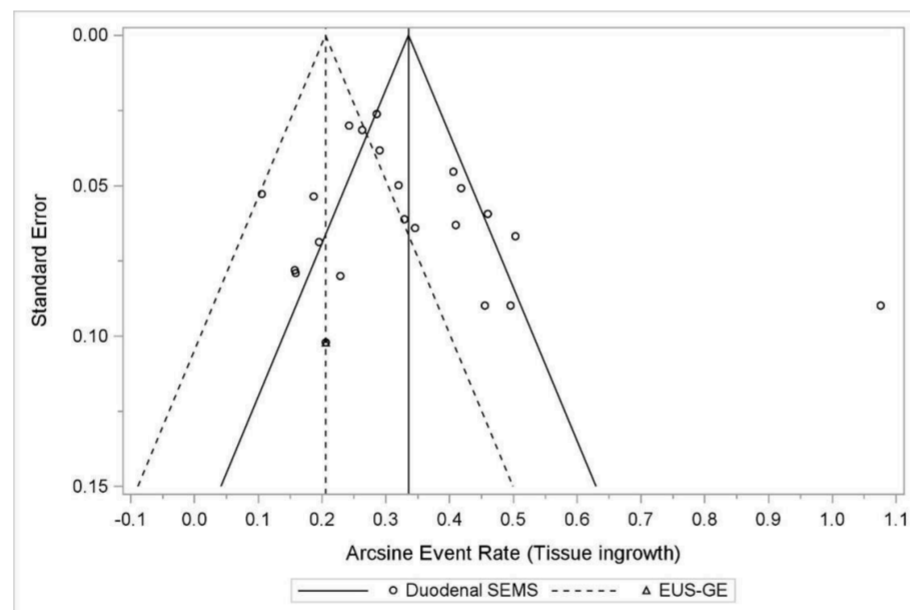


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I. Stent occlusion

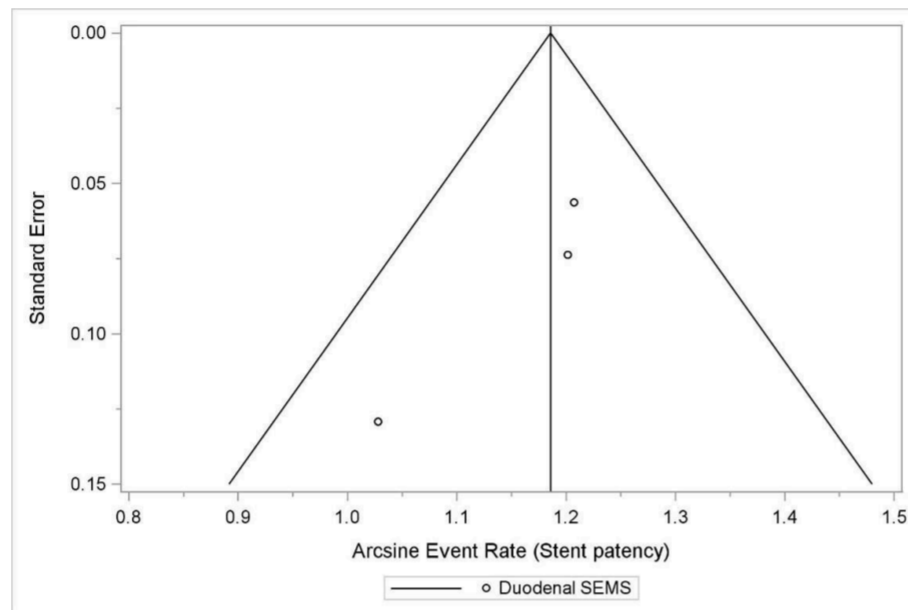


J. Tissue ingrowth

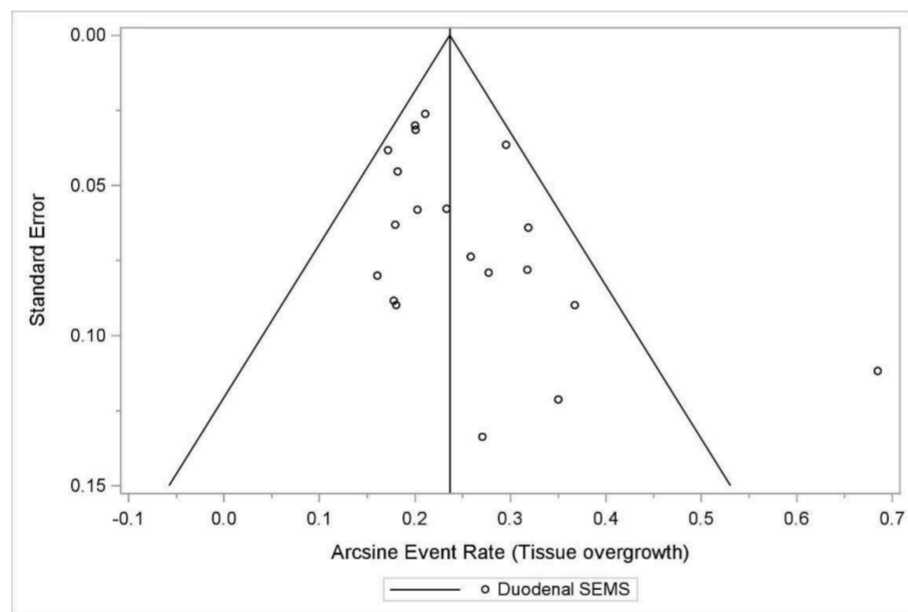


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K. Stent patency

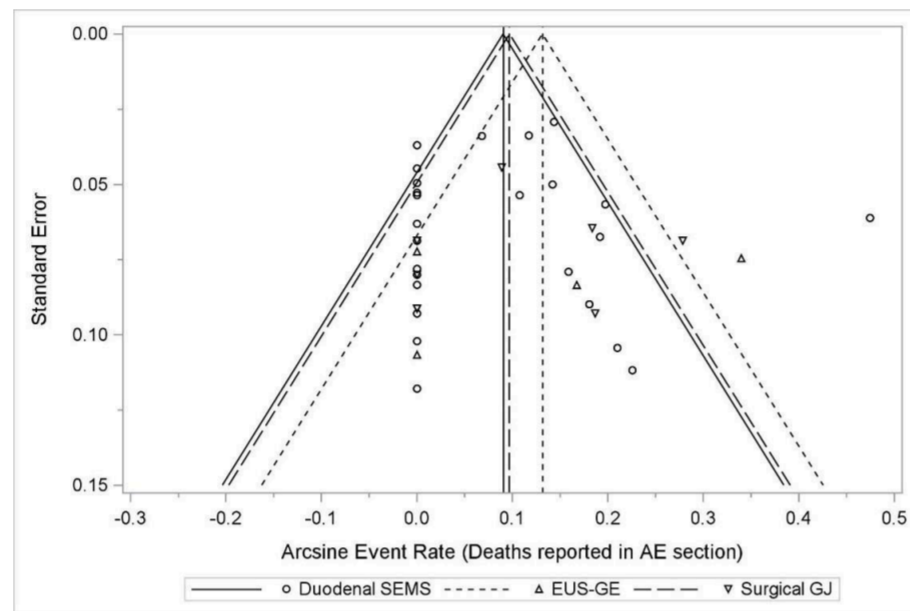


L. Tissue overgrowth



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M. Deaths reported in AE section



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