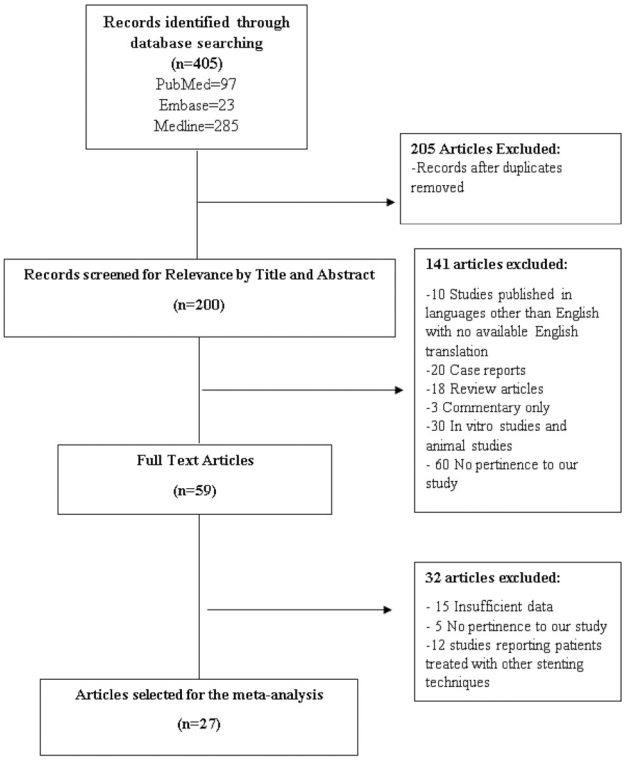
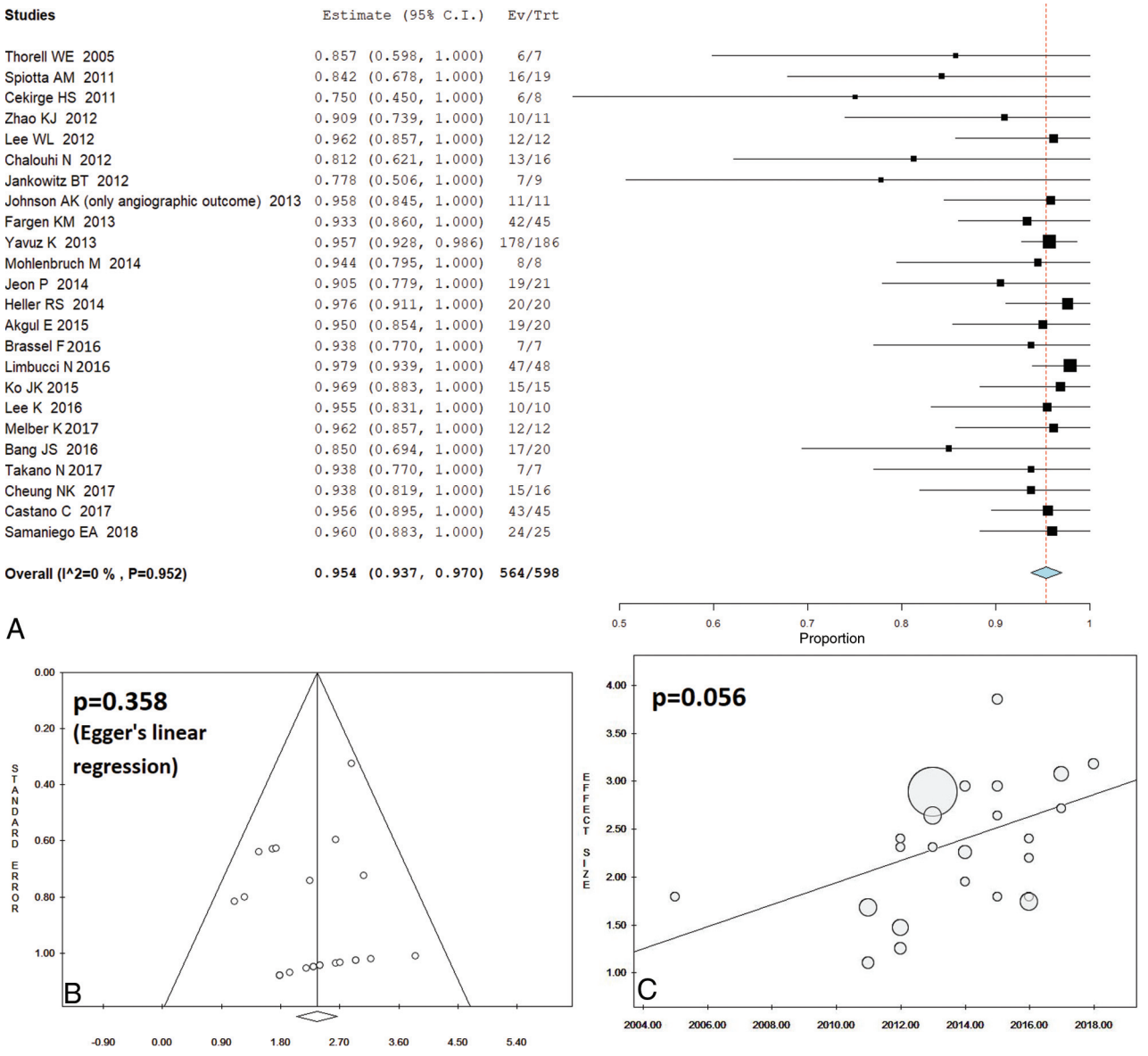
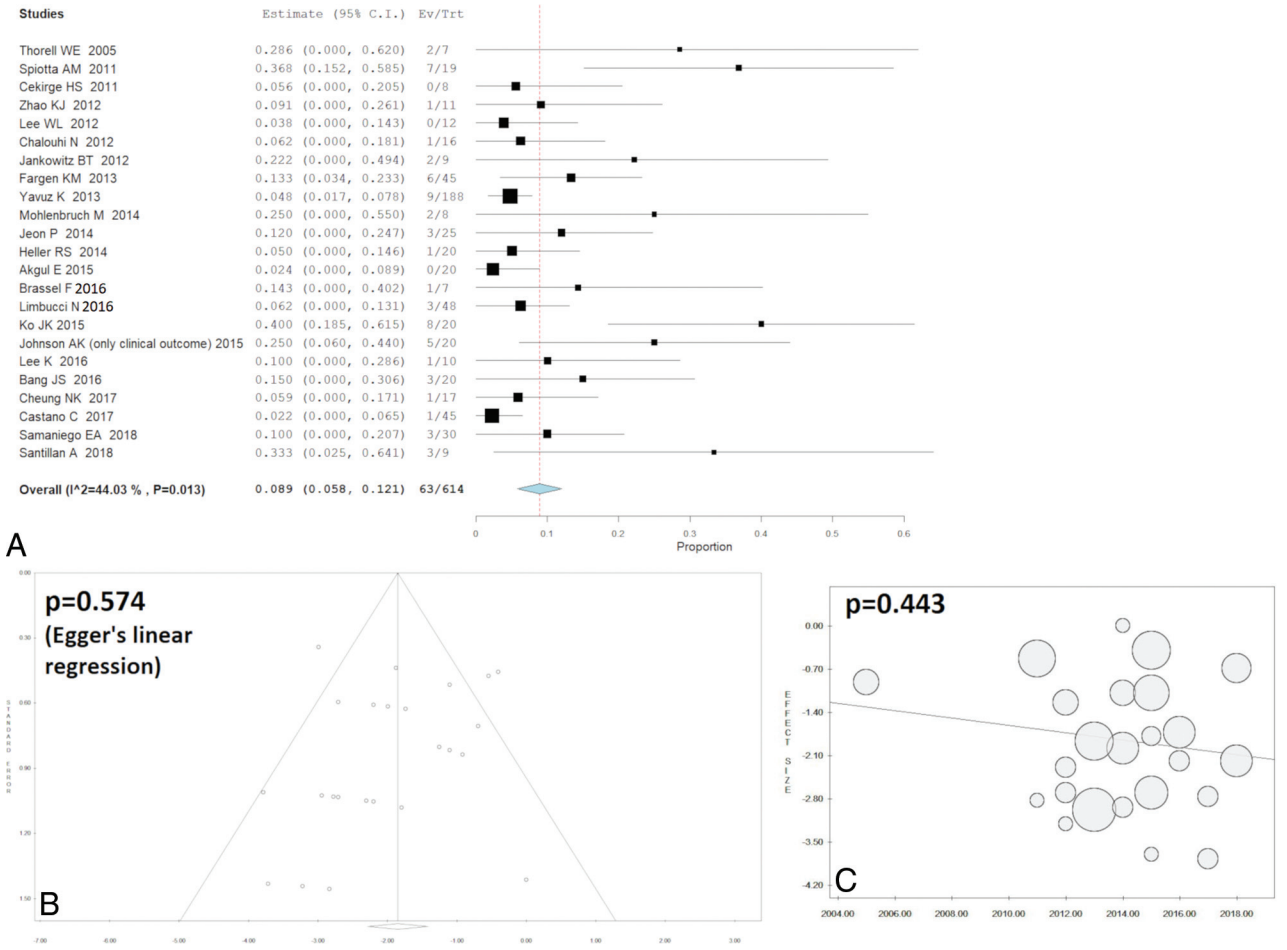


ON-LINE FIG 1. PRISMA diagram detailing the specifics of the systematic literature review.



ON-LINE FIG 2. Forest plot demonstrating the overall rate of aneurysm occlusion after Y-stent placement (*A*). Meta-regression shows a nonsignificant variation of the effect size (*B*). The funnel plot followed by the Egger linear regression test excludes publication bias (*C*).



ON-LINE FIG 3. Forest plot demonstrates the overall rate of treatment-related complications after Y-stent placement of intracranial aneurysms (*A*). Meta-regression shows a nonsignificant variation of the effect size (*B*). The funnel plot followed by the Egger linear regression test excludes publication bias (*C*).

On-line Table 1: Search syntax

PubMed Search Accessed on July 31, 2018 (97 Articles)	EMBASE Search Accessed on July 31, 2018 (23 Articles)	MEDLINE Search Accessed on July 31, 2018 (285 Articles)
(((Y(All Fields) AND stent(All Fields)) OR (Y(All Fields) AND stenting(All Fields))) AND (intracranial(All Fields) AND aneurysms(All Fields))) AND (((Y(All Fields) AND stent(All Fields)) OR (Y(All Fields) AND stenting(All Fields))) AND endovascular(All Fields))	'y stent' AND 'intracranial aneurysm' 'y stent' AND endovascular	((Y stent or Y stenting) and intracranial aneurysms).af. ((Y stent or Y stenting) and endovascular).af.

On-line Table 2: Summary of studies included in meta-analysis

Study Authors	Design	No. of Aneurysms Treated with Y-Stenting	Type of Technique	Successful Stent Deployment	Overall Complete/Near-Complete Occlusion	Overall Rate of Treatment-Related Complications	Description of Complication	Quality of Studies (NOS)
Thorell et al 2005[31]	R	7	Crossing	6/7	6/7	2/7	2 Periprocedural thromboembolic events	4
Spiotta et al 2011[27]	R	19	Crossing	18/19	16/19	7/19	1 Perforation + 1 dissection + 3 periprocedural thromboembolic events + 2 delayed ischemic complications	4
Cekirge et al 2011[14]	R	8	Crossing	8/8	6/8	0/8		4
Zhao et al 2012[32]	R	11	7 Crossing + 4 kissing	11/11	10/11	1/11	1 Periprocedural thromboembolic event	4
Lee et al 2012[33]	R	12	Crossing	12/12	12/12	0/12		4
Chalouhi et al 2012[34]	R	16	Crossing	NA	13/16	1/16	1 Periprocedural thromboembolic event	4
Jankowitz et al 2012[19]	R	9	Kissing	9/9	7/9	2/9	1 Intraprocedural aneurysm perforation + 1 delayed in-stent occlusion	4
Johnson et al 2013[35]	R	11	Crossing	10/11	11/11	NA		4
Fargen et al 2013[12]	RMC	45	Crossing	42/45	42/45	6/45	2 Intraprocedural aneurysm perforations + 3 cases of cranial nerve palsy + 1 periprocedural thromboembolic event	4
Yavuz et al 2013[13]	R	193 (188 Patients)	Crossing	193/196	178/186	9/188	3 Intraprocedural aneurysm perforations + 2 periprocedural and 4 delayed thromboembolic events	4
Bartolini et al 2014[18]	R	87	Crossing	NA	NA	NA	1 Delayed in-stent occlusion	4
Möhlenbruch et al 2014[36]	R	8	Crossing	8/8	8/8	2/8	2 Acute in-stent occlusions	4
Jeon et al 2014[17]	R	25	Crossing	NA	19/21	3/25	3 Periprocedural thromboembolic events	4
Heller et al 2014[37]	R	22	Crossing	20/22	20/20	1/20	1 Acute in-stent occlusion	4
Akgul et al 2015[29]	R	20	Crossing	20/20	19/20	0/20		4
Brassel et al 2016[25]	R	7	Kissing	7/7	7/7	1/7	1 Periprocedural thromboembolic event	4
Limbucci et al 2016[8]	R	52	Crossing	48/52	47/48	3/48	2 Intraprocedural aneurysm perforations + 1 delayed ischemic event after discontinuation of antiplatelet therapy	4
Ko et al 2015[20]	R	20	Crossing	20/20	15/15	8/20	4 Acute in-stent occlusions + 1 delayed in-stent occlusion + 1 dissection + 1 intraprocedural aneurysm ruptures + 1 PCA infarct	4
Johnson et al 2015[38]	R	20	Crossing	NA	NA	5/20 (NA)		4
Lee et al 2016[23]	R	10	Crossing	NA	10/10	1/10	1 Acute in-stent occlusion	4
Melber et al 2017[39]	R	20	Kissing	20/20	12/12	NA		3
Bang et al 2016[40]	R	20 (19 Patients)	Crossing	18/20	17/20	3/20	3 Ischemic events	3
Takano et al 2017[30]	R	7	Crossing	7/7	7/7	NA		3
Cheung et al 2018[41]	R	17	Crossing	17/17	15/16	1/17	1 Intraprocedural aneurysm perforation	4
Castaño et al 2017[26]	R	45	Crossing	45/45	43/45	1/45	1 Acute in-stent occlusion	4
Samaniego et al 2018[24]	RMC	30	Crossing	28/30	24/25	3/30	1 Acute in-stent occlusion + 1 PCA infarct + 1 ischemic temporal lesion	4
Santillan et al 2018[28]	R	9	Crossing	NA	NA	3/9	3 Acute in-stent occlusions	3

Note:—R indicates retrospective study; RMC, retrospective multicentric study; NOS, Newcastle-Ottawa Scale; NA, not available; PCA, posterior cerebral artery.

On-line Table 3: Quality measure of included studies by the Newcastle-Ottawa quality assessment scale[a]

	Selection				Comparability		Exposure			
Study Authors	1	2	3	4	a	b	1	2	3	Total
Akgul et al, 2015[29]	*	*				*	*			4
Brassel et al 2016[25]	*	*				*	*			4
Limbucci et al 2016[8]	*	*				*	*			4
Johnson et al 2013[35]	*	*				*	*			4
Johnson et al 2015[38]	*	*				*	*			4
Lee et al 2012[33]	*	*				*	*			4
Fargen et al 2013[12]	*	*				*	*			4
Lee et al 2016[23]	*	*				*	*			4
Thorell et al 2005[31]	*	*				*	*			4
Yavuz et al 2013[13]	*	*				*	*			4
Jankowitz et al 2012[19]	*	*				*	*			4
Zhao et al 2012[32]	*	*				*	*			4
Castaño et al 2017[26]	*	*				*	*			4
Takano et al 2017[30]	*	*					*			3
Spiotta et al 2011[27]	*	*				*	*			4
Samaniego et al 2018[24]	*	*				*	*			4
Santillan et al 2018[28]	*	*					*			3
Möhlenbruch et al 2014[36]	*	*				*	*			4
Bang et al 2016[40]	*	*					*			3
Melber et al 2017[39]	*	*					*			3
Jeon et al 2014[17]	*	*				*	*			4
Cekirge et al 2011[14]	*	*				*	*			4
Chalouhi et al 2012[34]	*	*				*	*			4
Cheung et al 2018[41]	*	*				*	*			4
Heller et al 2014[37]	*	*				*	*			4
Ko et al 2015[20]	*	*				*	*			4
Bartolini et al 2014[18]	*	*				*	*			4

[a] Newcastle-Ottawa Scale for quality assessment for retrospective studies (retrospective design; score 0–8; studies with ≥5 asterisks were considered high-quality).

Selection

1) Is the case definition adequate?
   a) Yes, with independent validation*
   b) Yes, eg record linkage or based on self-reports
   c) No description
2) Representativeness of the cases
   a) Consecutive or obviously representative series of cases*
   b) Potential for selection biases or not stated
3) Selection of controls
   a) Community controls*
   b) Hospital controls
   c) No description
4) Definition of controls
   a) No history of disease (end point)*
   b) No description of source

Comparability

1) Comparability of cases and controls on the basis of the design or analysis
   a) Study controls for (select the most important factor)*
   b) Study controls for any additional factor*; this criterion could be modified to indicate a specific control for a second important factor

Comparability (point a) was not tested because of the design of the reported studies

Comparability (point b) was tested comparing subgroups of analysis: One point was given if the study reported the analysis of the subgroups (anterior vs posterior circulation; ruptured vs unruptured, and so forth)

Exposure

1) Ascertainment of exposure
   a) Secure record (eg surgical records)*
   b) Structured interview blinded to case/control status*
   c) Interview not blinded to case/control status
   d) Written self-report or medical record only
   e) No description
2) Same method of ascertainment for cases and controls
   a) Yes*
   b) No
3) Nonresponse rate
   a) Same rate for both groups*
   b) Nonrespondents described
   c) Rate different and no designation.

On-line Table 4: Patient population and characteristics of intracranial aneurysms treated with Y-stenting

Variables	Raw Numbers (%)	No. of Articles	95% CI
Population characteristics			
No. of patients	744	27	
Mean/median age (yr)	56.6/57 (22–80)	15	
Proportion male	194/538 = 36%	16	32–40
Aneurysm characteristics			
No. of aneurysms	750	27	
Proportion of acutely ruptured aneurysms	66/592 = 11%	21	8.5–14
Aneurysm location			
Anterior circulation	366/601 = 61%		56–64
Posterior circulation	235/601 = 39%	22	35–43
Specific aneurysm location			
BT	235/601 = 39%		35–43
MCA	206/601 = 34.4%		30–38
AcomA	120/601 = 20%	22	16–23
A2A3	10/601 = 1.6%		0.8–3
ICA bif	30/601 = 5%		3–8
Mean aneurysm size (mm)	9.6 (median, 9.9; IQR = 8–10.5; range, 3–25)	23	
Treatment characteristics			
Type of stent/total of stents used			
Enterprise	476/1060 = 45%		42–47
Neuroform	332/1060 = 31.3%		28–40
LVIS	132/1060 = 12.5%	23	10–14
Solitaire	66/1060 = 6.2%		4.9–7.8
Acclino flex Stent	54/1060 = 5%		3.9–6.6
No. of aneurysms treated with nonhybrid technique (closed/closed-cell or open/open-cell)	512/585 = 87.5%	23	84–98
No. of aneurysms treated with hybrid technique (closed/open-cell stents)	73/585 = 12.5%	23	10–15
No. of aneurysms treated with crossing technique	688/750 = 92%	27	89–93
No. of aneurysms treated with kissing technique	60/750 = 8%	27	6–10
Radiologic follow-up (mo)	Mean: 14 (range, 6–24) Median: 12 (IQR = 10–18)	20	
Clinical follow-up (mo)	Mean: 17 (range, 3–30) Median: 16.5 (IQR = 7.8–21)	10	

Note:—BT indicates basilar tip; AcomA, anterior communicating artery; A2A3, distal anterior cerebral artery; ICA bif, internal carotid artery bifurcation.

On-line Table 5: Factors related to aneurysm occlusion and treatment-related complications after Y-stenting of intracranial bifurcation aneurysms[a]

Variables	Complete/Near-Complete Occlusion	No. of Articles	*P* Value	Treatment-Related Complications	No. of Articles	*P* Value
Aneurysm-related factors						
Unruptured aneurysms	180/194 = 95% (92–98) (I^2 = 0%)	14		29/236 = 8% (4.5–13) (I^2 = 36%)	16	
vs			.2			.02[b]
Ruptured aneurysms	40/43 = 90% (84–99) (I^2 = 0%)	10		11/52 = 18% (7–28) (I^2 = 21%)	11	
Small- or medium-sized aneurysms	98/107 = 92% (86–96) (I^2 = 0%)	9		14/106 = 9% (5–30) (I^2 = 0%)	9	
vs			.02[b]			.16
Large and very large/giant aneurysms	33/43 = 79% (67–91) (I^2 = 25%)	8		9/43 = 17% (6–27) (I^2 = 10%)	8	
Anterior circulation	98/103 = 92% (87–97) (I^2 = 0%)	13		14/109 = 13% (5–24) (I^2 = 56%) Ischemic 10/109 = 8.5% (1.5–13) (I^2 = 15%) Hemorrhagic 4/109 = 4% (0.8–6) (I^2 = 0%)	12	
vs			.27			.14
Posterior circulation	133/150 = 90% (85–94) (I^2 = 0%)	16		17/141 = 9.5% (5.8–15) (I^2 = 66%) Ischemic 16/141 = 8.5% (4–12) (I^2 = 0%) Hemorrhagic 1/141 = 0.7% (0.3–6) (I^2 = 0%)	16	
MCA aneurysms	52/54 = 94.9% (89–97) (I^2 = 0%)	10		4/54 = 7% (4–14) (I^2 = 0%)	10	
BT aneurysms	126/145 = 88.8% (83–93) (I^2 = 0%)	16		14/110 = 10% (5–16) (I^2 = 0%)	14	
ACA aneurysms	42/46 = 87% (78–96) (I^2 = 0%)	10		10/49 = 23% (8–38) (I^2 = 49%)	10	
Patient-related factors						
Younger than 60 years	82/89 = 92% (61–97) (I^2 = 93%)	10		8/80 = 7.4% (2–12) (I^2 = 0%)	9	
vs			.5			.6
Older than 60 years	65/73 = 89% (82–96) (I^2 = 0%)	9		9/73 = 8.7% (3–15) (I^2 = 10%)	9	
Treatment-related factors						
Crossing technique	526/556 = 95% (93–97) (I^2 = 0%)	20		56/572 = 8.4% (5–11) (I^2 = 46%)	21	
vs			.2			.4
Kissing technique	26/30 = 90% (80–96) (I^2 = 9%)	4		4/30 = 12.7% (3–24) (I^2 = 0%)	4	
First treatment	119/128 = 94% (89–98) (I^2 = 0%)	11		13/128 = 7.6% (32–12) (I^2 = 0%)	11	
vs			.01[b]			.19
Retreatment	40/48 = 82% (71–92) (I^2 = 0%)	6		7/48 = 14% (6–25) (I^2 = 0%)	6	
Nonhybrid technique	285/305 = 95% (93–97) (I^2 = 0%)	18		38/305 = 10% (5–14) (I^2 = 48%)	18	
vs			.2			.6
Hybrid technique	35/38 = 90% (81–95) (I^2 = 0%)	4		3/36 = 7.5% (1–15) (I^2 = 0%)	3	

Note:—BT indicates basilar tip; ACA, anterior cerebal artery.

[a] Numbers in parentheses indicate 95% confidence interval.

[b] Significant.

On-line Table 6. Association between type of stent used and treatment-related outcomes after Y-stenting of intracranial aneurysms

Type of Stent	Complete/Near-Complete Occlusion (95% CI) (I^2)	Treatment-Related Complications (95% CI) (I^2)	No. of Articles
Enterprise	98/101 = 96% (93–98) (0%)	8/99 = 6.5% (1.6–11) (0%)	6
Neuroform	119/130 = 94% (90–98) (14%)	20/131 = 14% (5–26) (69%)	8
Braided stents (LVIS)	52/56 = 92% (85–99) (0%)	9/64 = 11% (3–20) (18%)	5