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7th IMAD meeting

Early Outcomes of Carotid Revascularization in Retrospective Case Series

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Disclosure

Speaker name: Prof. Athanasios Giannoukas

☐ I have the following potential conflicts of interest to report:

- ☐ Receipt of grants/research support
- ☐ Receipt of honoraria and travel support
- ☐ Participation in a company-sponsored speaker bureau
- ☐ Employment in industry
- ☐ Shareholder in a healthcare company
- ☐ Owner of a healthcare company

☒ I do not have any potential conflict of interest

Carotid Artery Stenting (CAS) vs Carotid Endarterectomy (CEA)



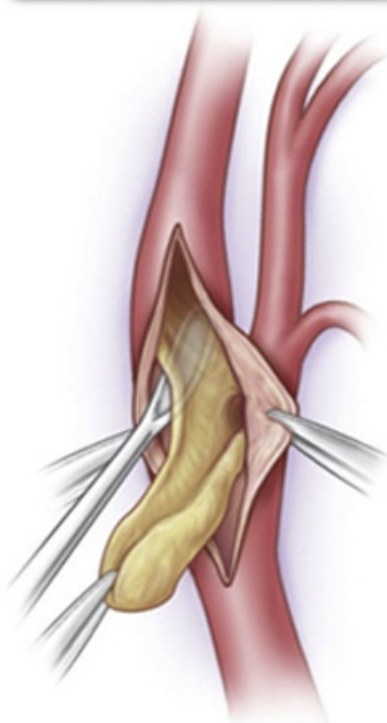
Retrospective, single center study



1853 CEA, 478 CAS

CEA

Symptomatic: 29.1%



Outcomes

at 30 days

1.1%

Stroke

2.2%

Acute MI

0.7%

Death

at 5.4 years

6.8%

Stroke

22.7%

Acute MI

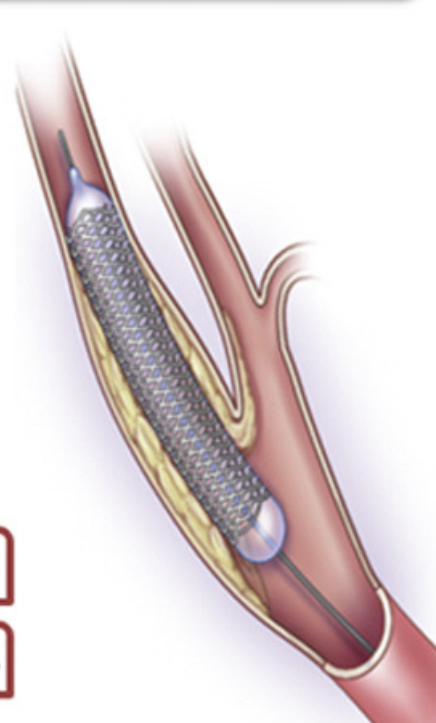
28.4%

Death

$P = NS$

CAS


Symptomatic: 32.2%




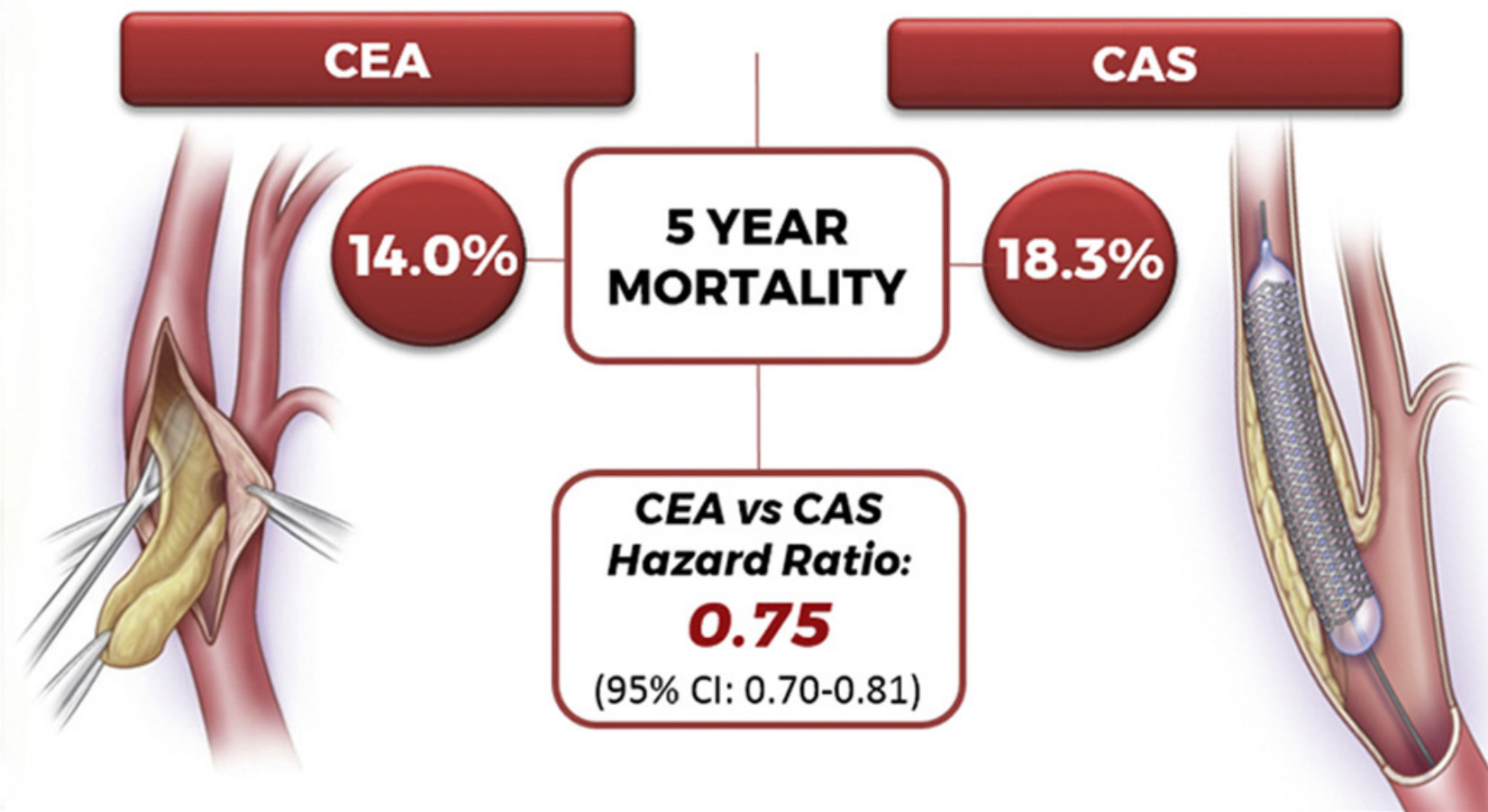
CONCLUSION

CEA and CAS can be performed with excellent outcomes by vascular surgeons at a large-volume hospital

Long-Term Mortality Following Carotid Endarterectomy (CEA) and Carotid Stenting (CAS)

 Retrospective review of VQI database

 29,235 CEAs, 4,415 CASs



TAKE HOME MESSAGE

Patients who underwent CEA were 25% less likely to die than those who had CAS

Last Neurologic Event Is Associated With Risk Of Stroke Or Death After Carotid Endarterectomy (CEA) Or Stenting (CAS)



Retrospective review of the German statutory quality assurance database



CEA:
144,347
patients



CAS:
14,794
patients

Regression
Analysis

- **Increased severity of last neurologic event** was **associated with** increasing risk of **in-hospital stroke or death** for both CEA and CAS ($P < .004$)
- **Risk of stroke or death did not differ between asymptomatic patients and patients with amaurosis fugax** before CEA ($P = .219$) or CAS ($P = .124$).



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Tsantilas et al. *J Vasc Surg* November 2019

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Thirty-Day Readmissions After Carotid Artery Stenting Versus Endarterectomy: Analysis of the 2013-2014 Nationwide Readmissions Database

85,337 patients (national estimate of 194,332)
with carotid artery stenosis

Carotid Endarterectomy (CEA)
N=73,847



Carotid Stenting (CAS)
N=11,490

30-Day Crude Readmission Rates:
CEA < CAS (6.8% vs 8.3%, $p < 0.001$)

30-Day Propensity-Matched Readmission Rates:
CEA = CAS (7.9% vs 8.4%, $p = 0.20$)





Most common reasons for readmission:
neurological/cerebrovascular & cardiac events
Acute myocardial infarction and heart failure most frequent cardiac
reasons for readmission

Lima et al. Circulation: Cardiovascular interventions 2020;13:e008508



Review

Early Outcomes of Carotid Revascularization in Retrospective Case Series

Petroula Nana ¹, George Kouvelos ^{1,*}, Alexandros Brotis ², Konstantinos Spanos ¹, Efthimios Dardiotis ³,
Miltiadis Matsagkas ¹ and Athanasios Giannoukas ¹

J. Clin. Med. **2021**, 10, 935. <https://doi.org/10.3390/jcm10050935>

Most data in carotid stenosis treatment arise from randomized control trials (RCTs) and cohort studies

The aim of this meta-analysis:

- to compare 30-day outcomes in real world practice from centers providing both modalities

Identification

Screening

Eligibility

Included

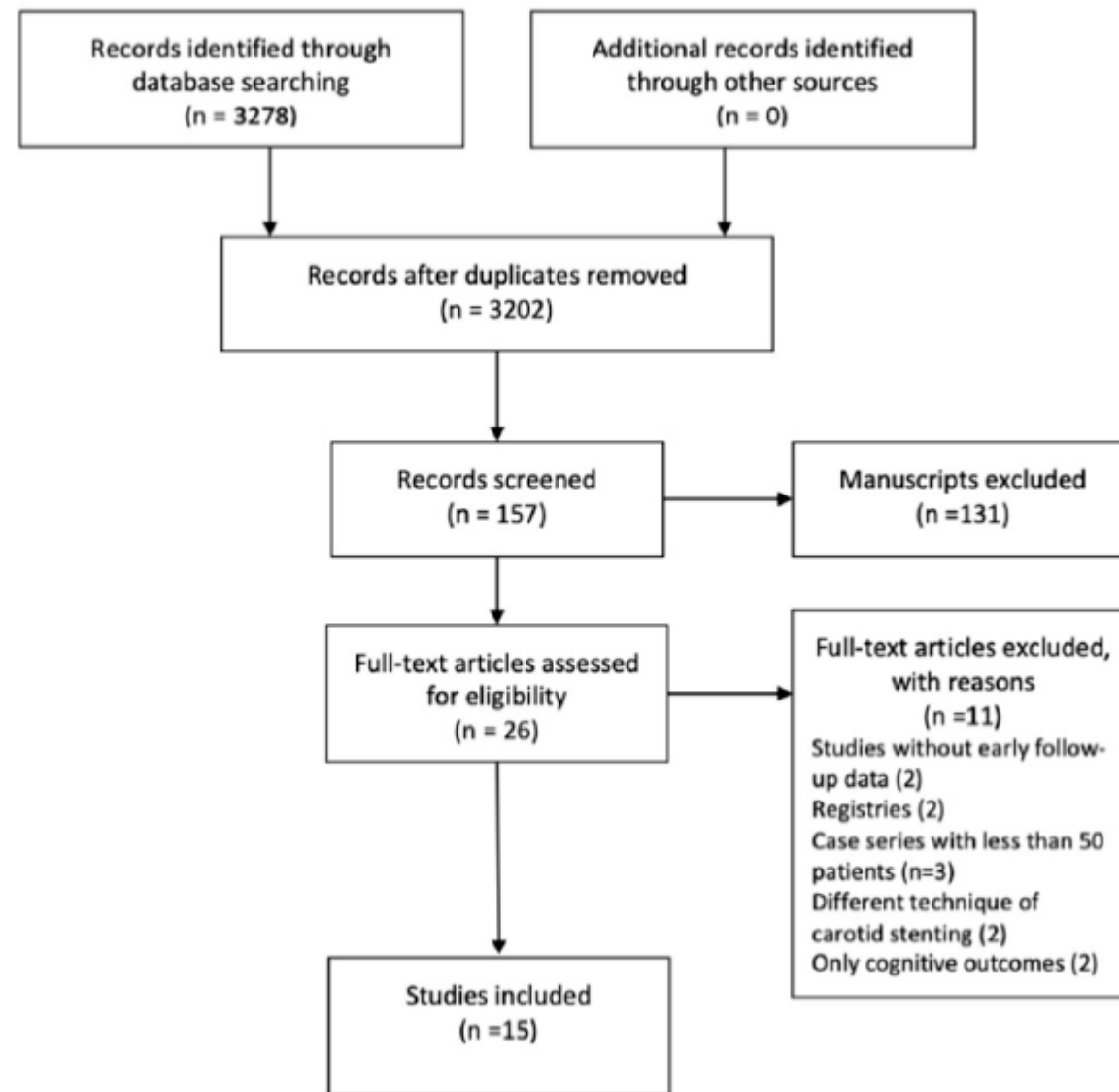


Table 1. The studies' characteristics.

References	Period	Specialties	Patients	Male (N, %)	Age (Median or Mean + _SD)	Symptomatic (N, %)	CEA	CAS
Kastrup et al. [11]	1999–2001	VS, IR	242	180 (74.3)	70	155 (64)	142	100
Marine et al. [12]	2003–2005	VS	248	148 (59.7)	NA	0 (0)	145	93
Tang et al. [13]	2001–2006	VS	326	202 (61.9)	71	0 (0)	206	120
De Rango et al. [14]	2004–2009	VS	567	0 (0)	71	152 (26.7)	325	306
Lindström et al. [15]	2004–2011	VS, IR	6940	NA	NA	NA	6474	466
Steinbauer et al. [16]	1999–2002	VS, IR	87	NA	68.5 ± 7.9	87 (100)	44	43
Tas et al. [17]	2011–2012	VS, IC	65	51 (78.5)	NA	65 (100)	32	33
Setacci et al. [18]	2000–2010	VS	4638	4005 (86.4)	73.8	NA	2453	2628
Brooks et al. [19]	1998–2002	VS, IC	189	NA	NA	104 (55)	94	95
Grimm et al. [20]	2005–2012	VS	182	104 (57.1)	NA	55 (30.2)	88	94
Fantozzi et al. [21]	2002–2013	VS	166	93 (56)	86.9	35 (21)	45	129
De Rango et al. [22]	2001–2009	VS	949	670 (70.6)	64	282 (29.7)	500	449
Meller et al. [23]	2007–2013	CAS: IC, IR, NR	718	452 (62.9)	72	270 (37.6)	525	193
Spanos et al. [24]	2006–2016	VS	413	333 (80.6)	69 ± 7.6	135 (32.7)	346	67
Rizwan et al. [25]	2005–2017	VS	313	184 (58.8)	NA	110 (35.1)	147	166

SD: standard deviation, CEA: carotid endarterectomy, CAS: carotid artery stenting, NA: not available, VS: vascular surgeons, IC: interventional cardiologists, IR: interventional radiologists, NR: neurosurgeons.

Table 2. Patients' comorbidities in each group.

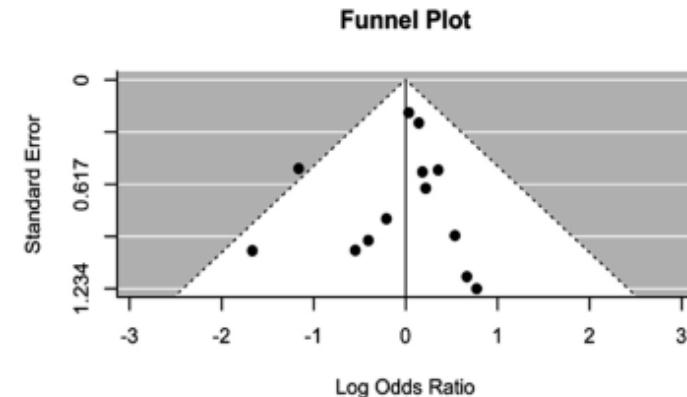
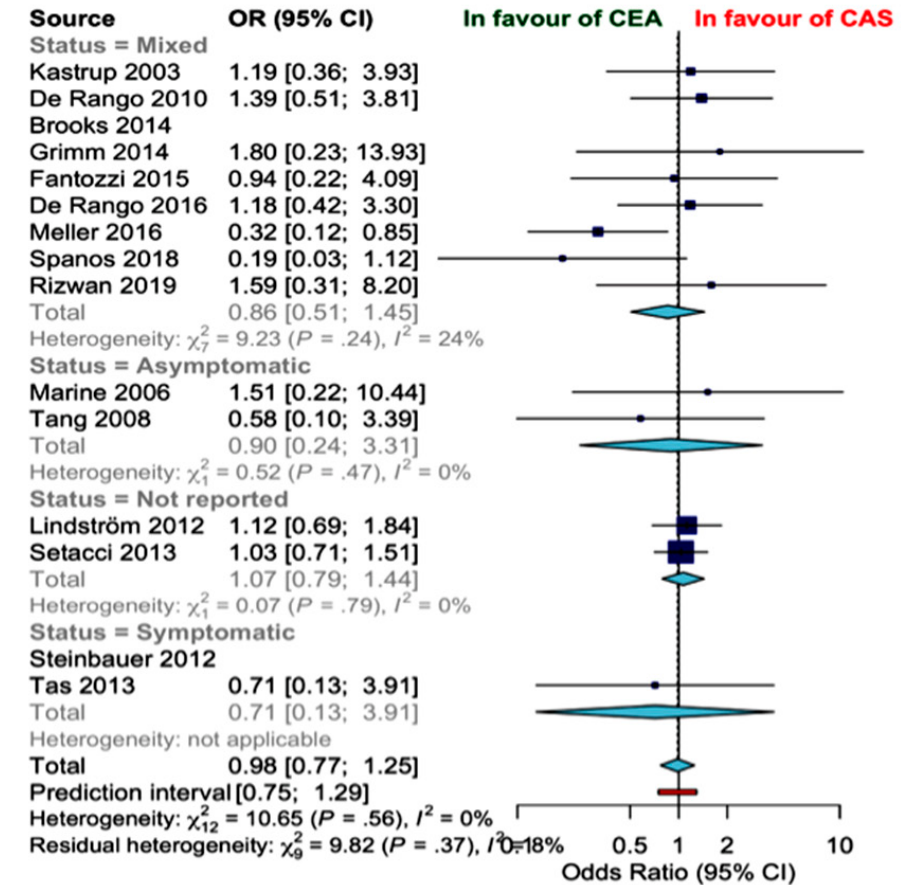
Studies	CEA				CAS			
	Smoke	HT	DLP	DM	Smoke	HT	DLP	DM
Kastrup et al. [11]	42 (29.6)	118 (83)	63 (44.4)	46 (32.4)	30 (30)	86 (86)	48 (48)	26 (26)
Marine et al. [12]	79 (54.5)	112 (77.2)	97 (66.9)	44 (30.3)	54 (58.1)	85 (91.4)	70 (75.3)	35 (37.6)
Tang et al. [13]	53 (25.7)	169 (82)	138 (67)	60 (29.1)	19	106 (88.3)	84 (70)	38 (31.6)
De Rango et al. [14]	NA	271 (83.4)	178 (54.8)	94 (28.9)	NA	264 (86.3)	196 (64.1)	87 (28.4)
Lindström et al. [15].	NA	NA	NA	NA	147 (31.5)	342 (73.4)	NA	122 (26.2)
Steinbauer et al. [16]	28 (63.6)	34 (77.3)	23 (52.3)	15 (34.1)	19 (44.2)	34 (79.1)	22 (50)	19 (44.2)
Tas et al. [17]	25 (78.1)	21 (65.6)	NA	20 (62.5)	20 (60.6)	25 (75.8)	NA	11 (33.3)
Setacci et al. [18]	1298 (28)	1763 (38.01)	641 (13.8)	832 (17.9)	1415 (53.8)	1653 (62.9)	723 (27.5)	954 (36.3)
Brooks et al. [19]	NA	NA	NA	NA	NA	NA	NA	NA
Grimm et al. [20]	NA	83 (94.3)	85 (96.5)	36 (40.9)	NA	83 (88.3)	72 (76.6)	27 (28.7)
Fantozzi et al. [21]	NA	NA	NA	NA	NA	NA	NA	NA
De Rango et al. [22]	NA	370 (74)	301 (60.2)	156 (31.2)	NA	373 (83.1)	308 (68.6)	151 (33.6)
Meller et al. [23]	257 (49)	474 (90.3)	430 (81.9)	168 (32)	109 (56.5)	182 (94.3)	172 (89.1)	83 (43)
Spanos et al. [24]	237 (96.3)	324 (93.6)	293 (84.7)	95 (27.5)	52 (77.6)	61 (91)	48 (71.6)	15 (22.4)
Rizwan et al. [25]	114 (77.6)	137 (93.2)	132 (89.8)	40 (27.2)	123 (74.1)	155 (93.4)	159 (95.8)	62 (37.3)

CEA: carotid endarterectomy, CAS: carotid artery stenting, HT: hypertension, DLP: dyslipidemia, DM: diabetes mellitus, NA: not available.

In 13 studies the 30-day estimated pooled proportion incidence of neurological event was:

- ❑ 2.4% (95% CI: 1.69–3.4%) for CEA
- ❑ 2.75% (2.01–3.76%) for CAS

No difference between the two techniques (odds ratio (OR) 0.98; 0.77–1.25; $I^2 = 0\%$)

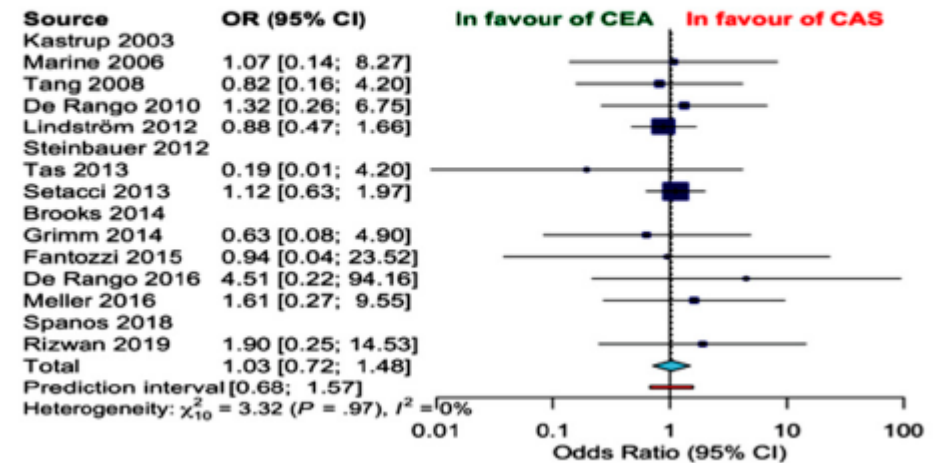


In 13 studies the 30-day estimated pooled proportion incidence of MI was:

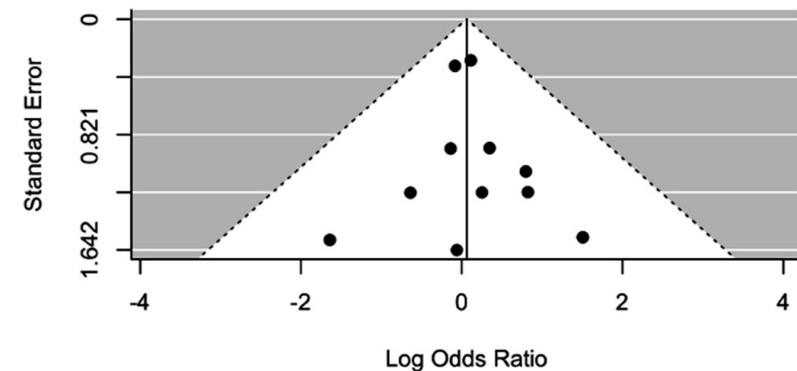
- ❑ 1.66% (1.44–1.93%) for CEA
- ❑ 1.16% (0.08–1.55%) for CAS

No difference between the two techniques (OR 1.03; 0.72–1.25; $I^2 = 0\%$)

Forest Plot



Funnel Plot

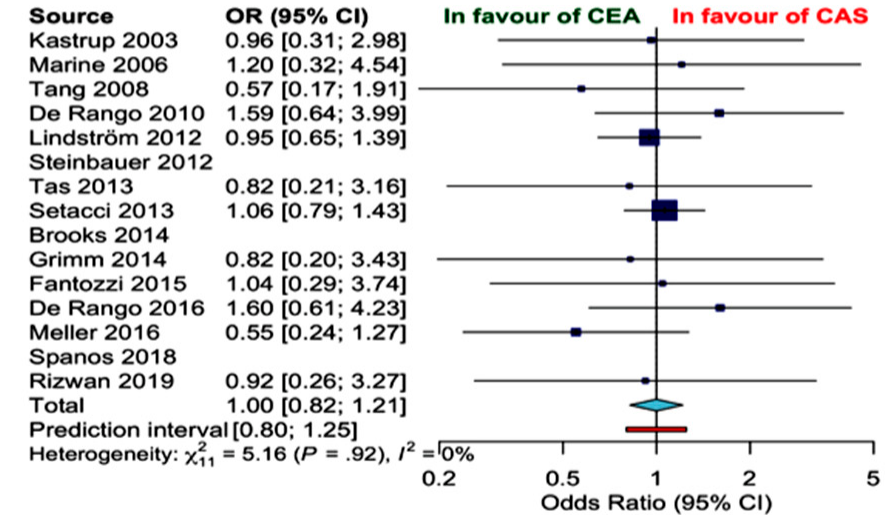


In 12 studies the 30-day estimated pooled proportion incidence of all events (neurological events/MI/death) was:

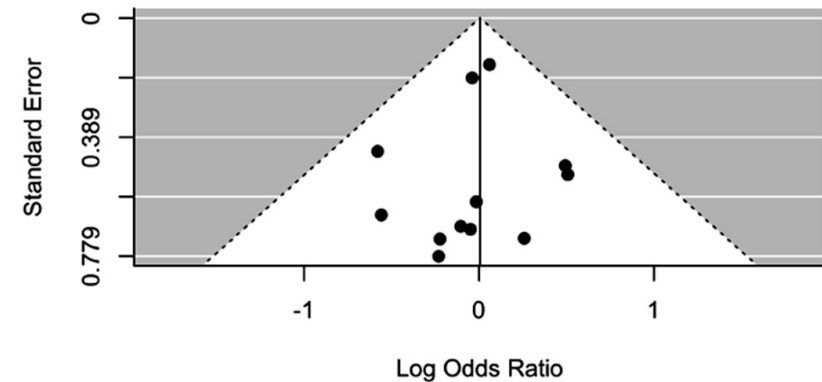
- ❑ 3.96 (2.95–5.30) for CEA
- ❑ 4.23 (3.11–5.74) for CAS

No difference between the two techniques (OR 1.0 0.82–1.21, $I^2 = 0\%$).

Forest Plot

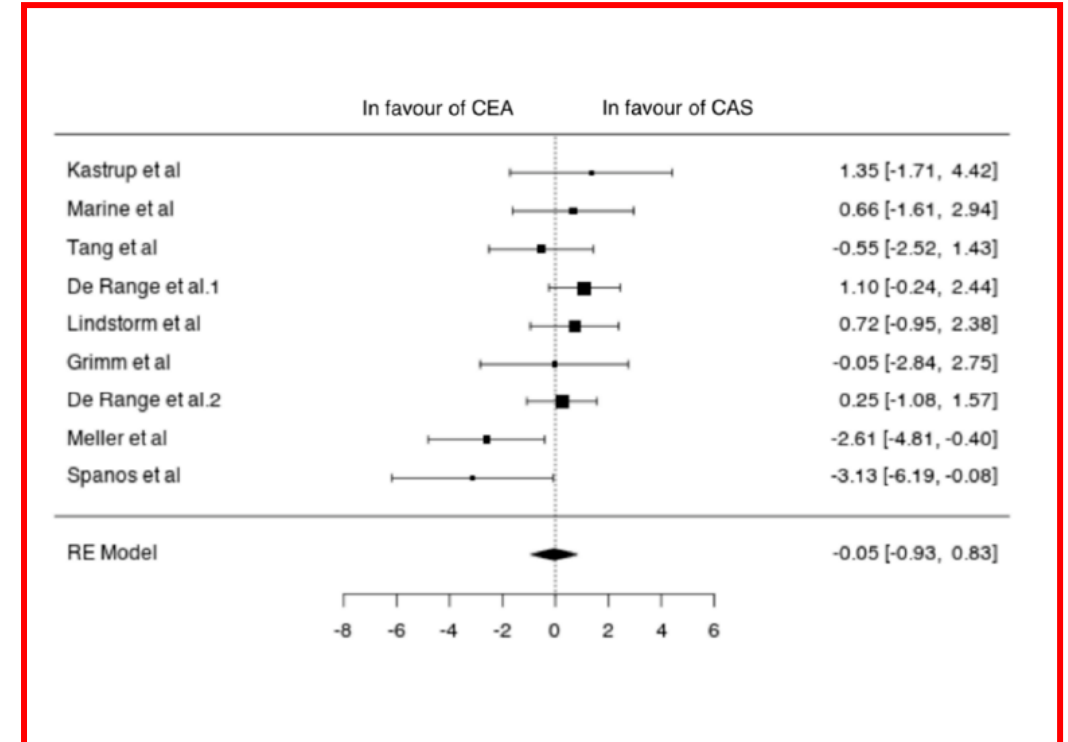


Funnel Plot



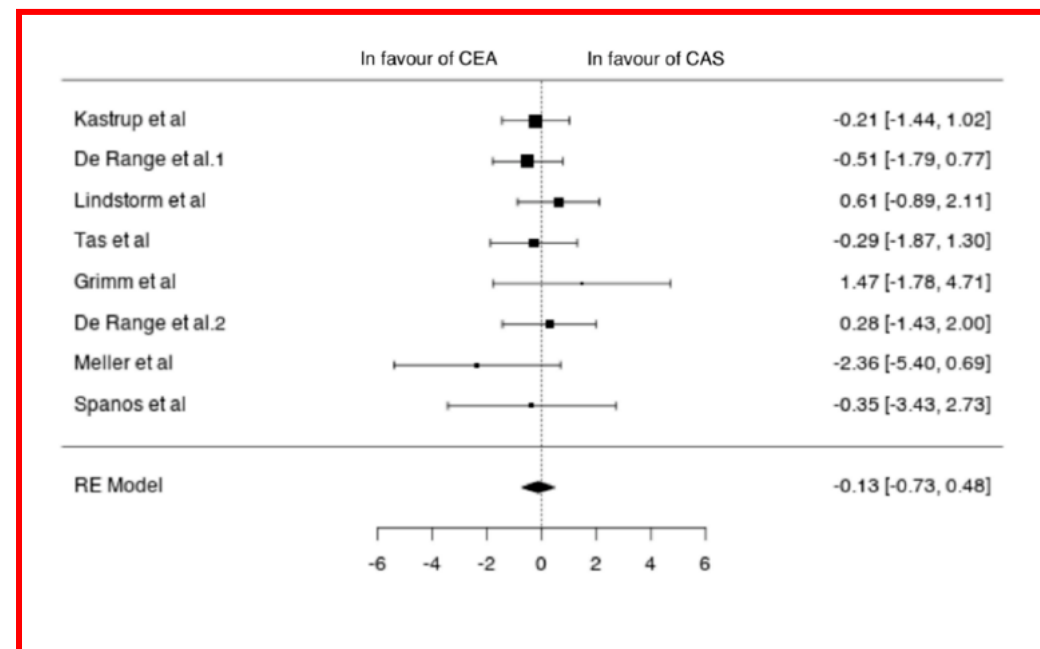
Data on asymptomatic patients were available from 9 studies (2850 patients; 1707 CEA, 1143 CAS)

- In asymptomatic patients undergoing **CEA** the pooled incidence:
 - Neurological event was 1% (95% CI 0–2%)
 - MI was 0% (95% CI 0–1%)
 - Death was 0% (95% CI 0–1%)
- In asymptomatic patients undergoing **CAS** the pooled incidence:
 - Neurological events was 1% (95% CI 0–2%)
 - MI was 1% (95% CI 0–1%)
 - Death was 1% (95% CI 0–1%)
- ❖ The two techniques did not differ in terms of neurological events, MI and death



Data on **symptomatic patients** were available from 8 studies (1671 patients; 1151 CEA, 520 CAS)

- In symptomatic patients undergoing **CEA** the pooled incidence:
 - Neurological event was 3% (95% CI 1–4%)
 - MI was 0% (95% CI 0–1%)
 - Death was 1% (95% CI 0–1%)
- In symptomatic patients undergoing **CAS** the pooled incidence:
 - Neurological events was 3% (95% CI 1–4%)
 - MI was 1% (95% CI 0–1%)
 - Death was 1% (95% CI 0–2%)
- ❖ The two techniques **did not differ** in terms of neurological events, MI and death



Conclusions

- In real world practice among centers providing **both CEA and CAS**, **no differences** were found between the techniques in 30-day outcomes.
- The **incidence of 30-day neurologic events, MI and death** remains low (even lower than in some RCTs)
- These findings reiterate the importance of a tailored therapeutic strategy with detailed evaluation and careful patient selection
- “Real-world” outcomes may only be valid from centers providing both treatments being able to provide a true tailored therapeutic strategy

Thank you

