CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES IN VASCULAR SURGERY
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MARRIOTT RIVE GAUCHE & CONFERENCE CENTER
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Internal carotid artery near-total occlusions: Is it justified to operate on them?

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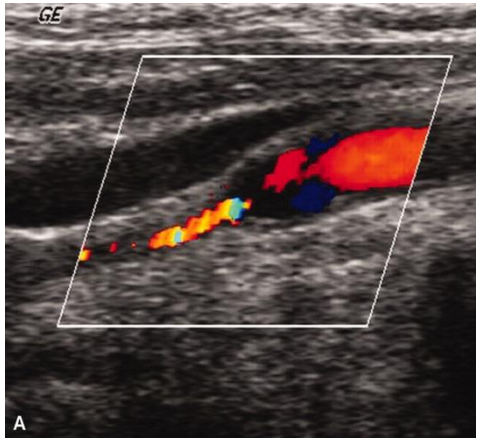
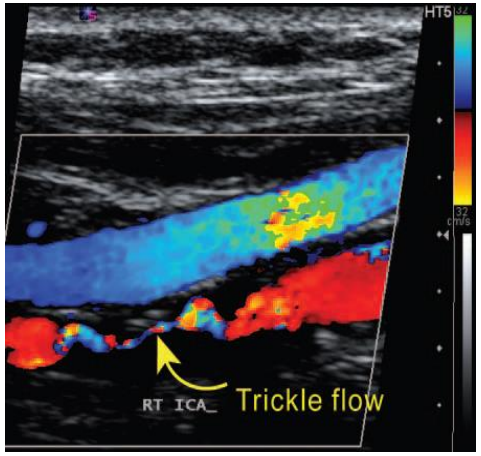
NO DISCLOSURES RELATED TO THE TOPIC

ICA near total occlusion

synonyms

critical stenosis,
near total occlusion,
sub-occlusion,
pre-occlusion,
pseudo-occlusion,
string sign,
slim sign
lotus root sign





Lee et.al., Neurological Science, 2012

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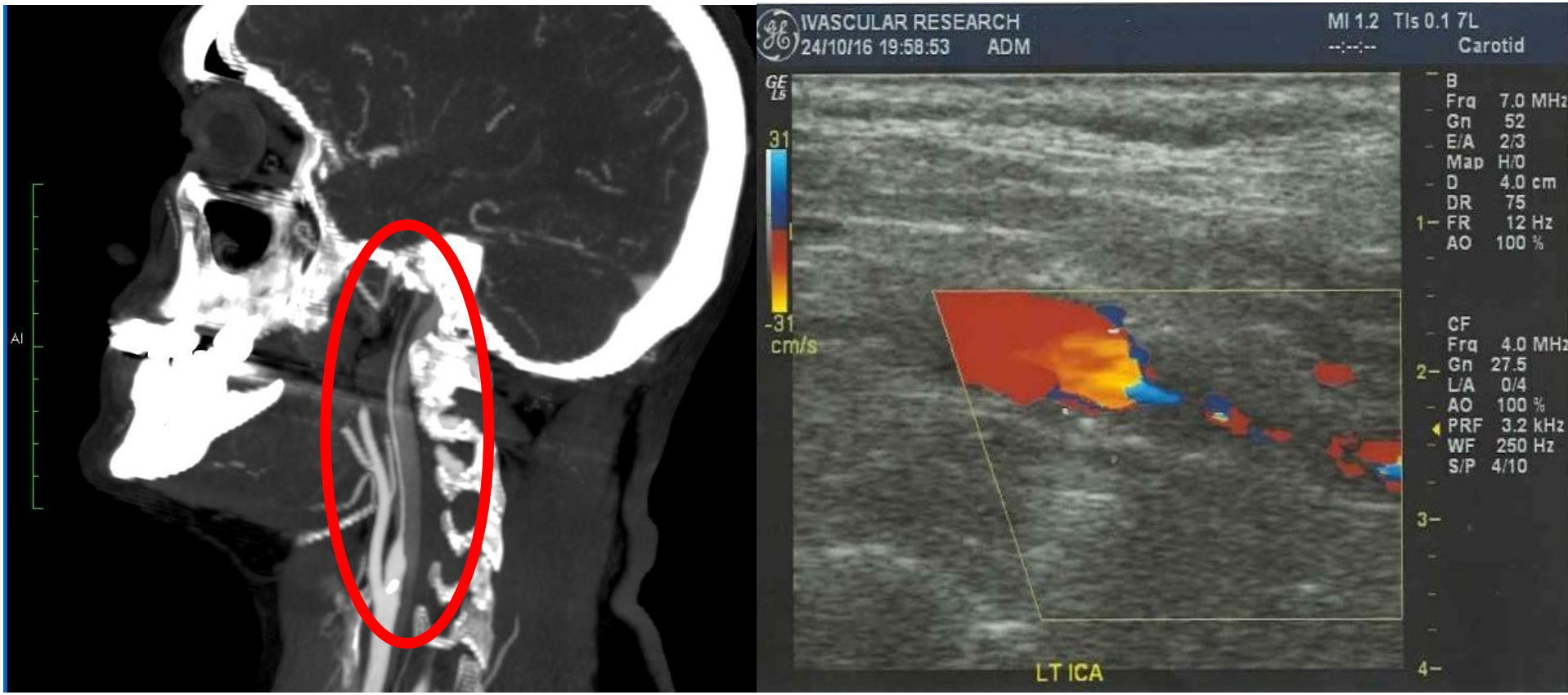
ICA near total occlusion



M, 70-y, recently symptomatic

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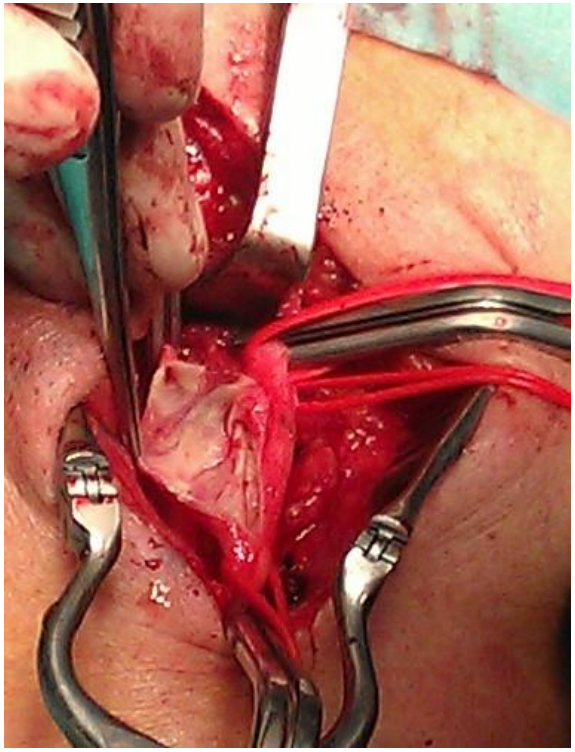
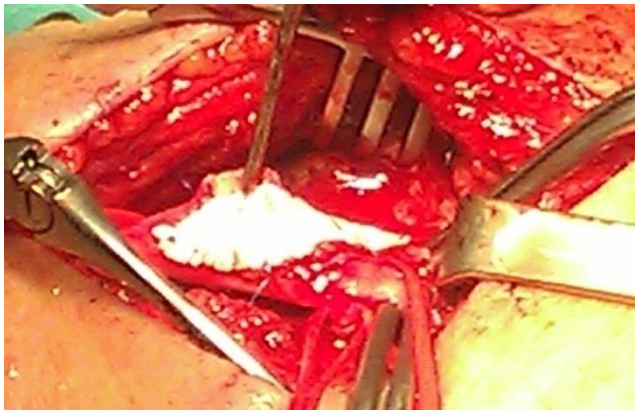
ICA near total occlusion





M, 70-y, recently symptomatic

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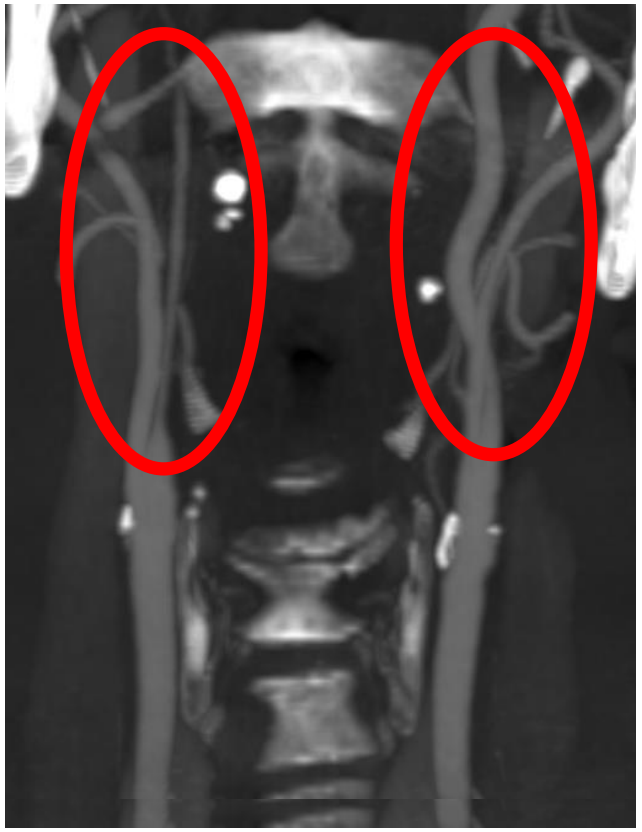
Radiological criteria for the diagnosis of ICA near total occlusion

- **reduction in ICA diameter** compared with the ipsilateral ECA
- obviously **reduced diameter of the ICA** compared with the contralateral ICA



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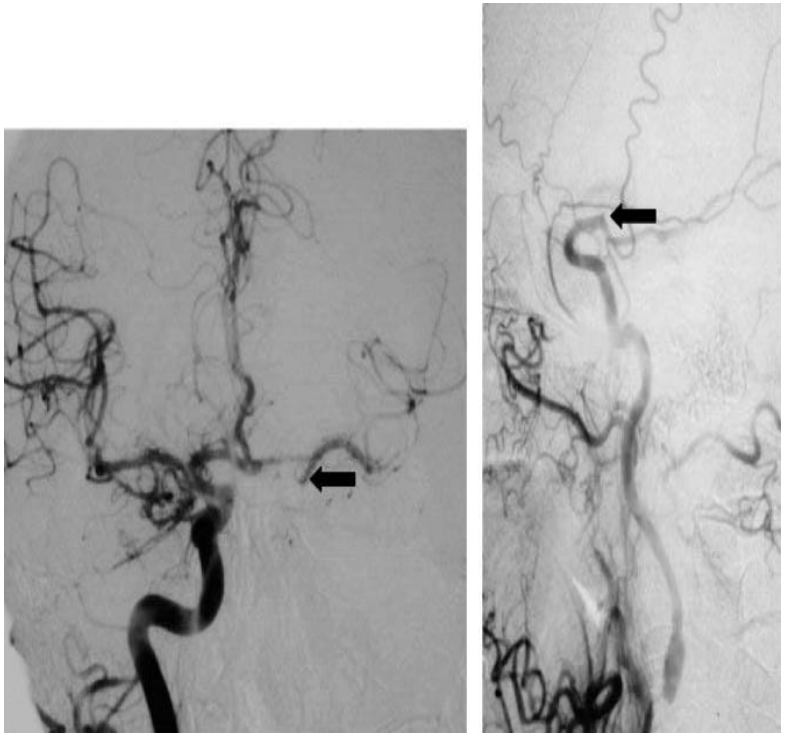
Radiological criteria for the diagnosis of ICA near total occlusion

- **intracranial collaterals** seen as cross-filling of contralateral vessels or ipsilateral contrast dilution
- **delayed cranial arrival of ICA contrast** compared with that of the ECA



Fox. et.al., American Journal of Neuroradiology, 2005

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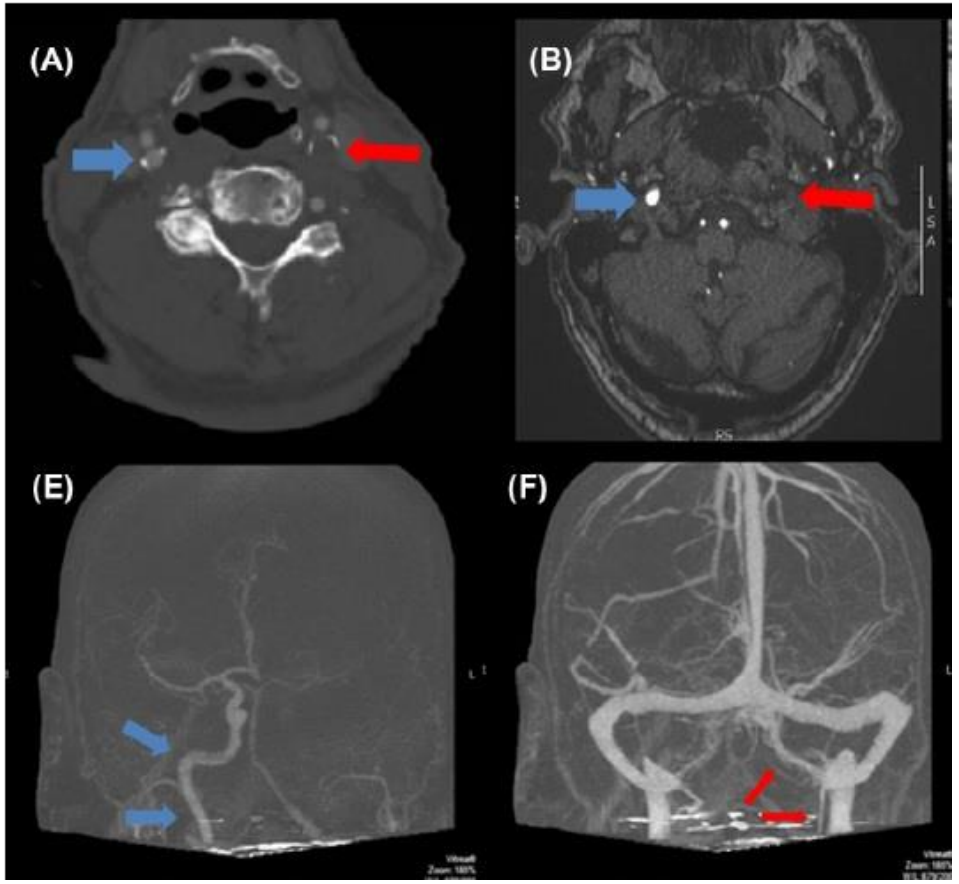
Carotid Pseudo-Occlusion in Hyperacute Stroke

Acute stroke patients with an apparent tandem occlusion on conventional single-phase CTA can have delayed antegrade ICA flow on 4D-CTA.

4D-CTA is a novel noninvasive technique that can identify carotid pseudo-occlusion in the acute stroke setting.



Ng FC et.al J Neuroimaging. 2016

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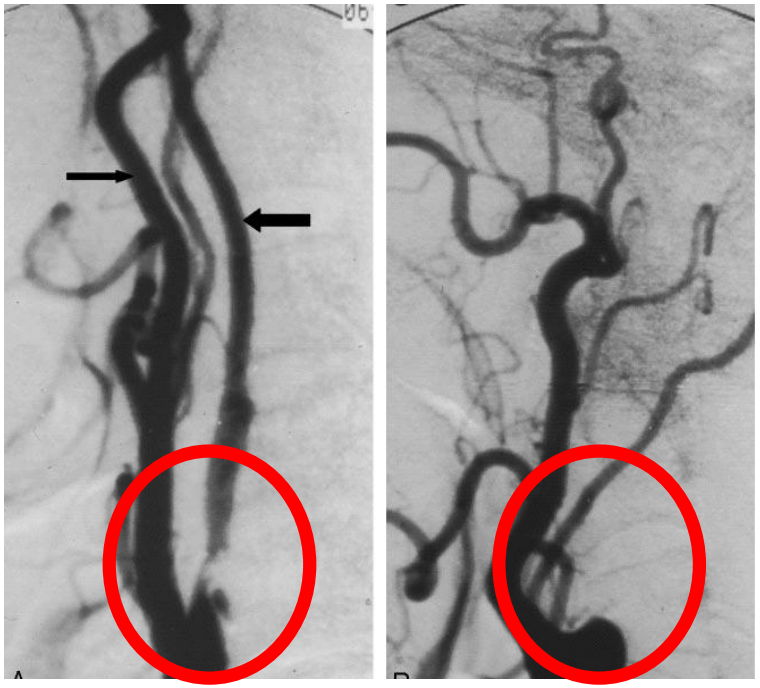
Natural history of ICA near total occlusion

Incidence: 4.3% (NASCET, ECST) Risk of stroke: 6.2% per year

Progression to occlusion



40% at 12 months:
Radak et.al, Ann Vasc Surg 2010

100% at 34 months:
O'Leary et al, Stroke 1989

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Outcomes associated with carotid pseudo-occlusion

500 patients were examined for CS by cerebral angiography; those with severe CS ≥ 70% (CS group) or with PO (PO group) were enrolled in this study. The primary endpoint was defined as the combined endpoint of the occurrence of stroke, myocardial infarction, or death. Patients without any events were censored at 60 months.

CONCLUSION:

Patients in the PO group more frequently had neurological and cardiac events or died compared with those in the CS group (p = 0.013).

Ogata T. et.al Cerebrovasc Dis. 2011

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ICA near total occlusion

Pooled data from NASCET, ECST, VA:

5-year risk of any stroke among symptomatic patients

CETC: 5-Year Risk of Any Stroke (Including 30-Day Stroke or Death) from the Combined VA, ECST, and NASCET Trials*†

				5-Year Risk					
Trial	Stenosis	*n*	30-Day CEA Risk (%)	Surgery (%)	Medical (%)	ARR (%)	RRR (%)	NNT	Strokes Prevented per 1000 CEAs at 5 Years‡
CETC	<30%	1746	Unknown	18.36	15.71	−2.6	N/B	N/B	None
CETC	30-49%	1429	6.7	22.80	25.45	+2.6	10	38	26
CETC	50-69%	1549	8.4	20.00	27.77	+7.8	28	13	78
CETC	70-99%	1095	6.2	17.13	32.71	+15.6	48	6	156
CETC	String sign	262	5.4	22.40	22.30	−0.1	N/B	N/B	None

No benefit of surgery over BMT for **symptomatic** patients with **string sign**

Rothwell et.al, Lancet, 2003

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String sign carotids are excluded from recent RCTs !!!

Anatomic Exclusions

ICSS, 2010

common carotid artery stenosis, or internal carotid artery pseudo-occlusion were excluded, as were patients unsuitable for endarterectomy because of the distal site

CREST, 2010

"string sign" >1 cm of the ipsilateral common or internal carotid artery.

CREST- 2

32. "String sign" of the ipsilateral common or internal carotid artery.

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Is the surgical management of near total occlusion of the internal carotid artery justified?

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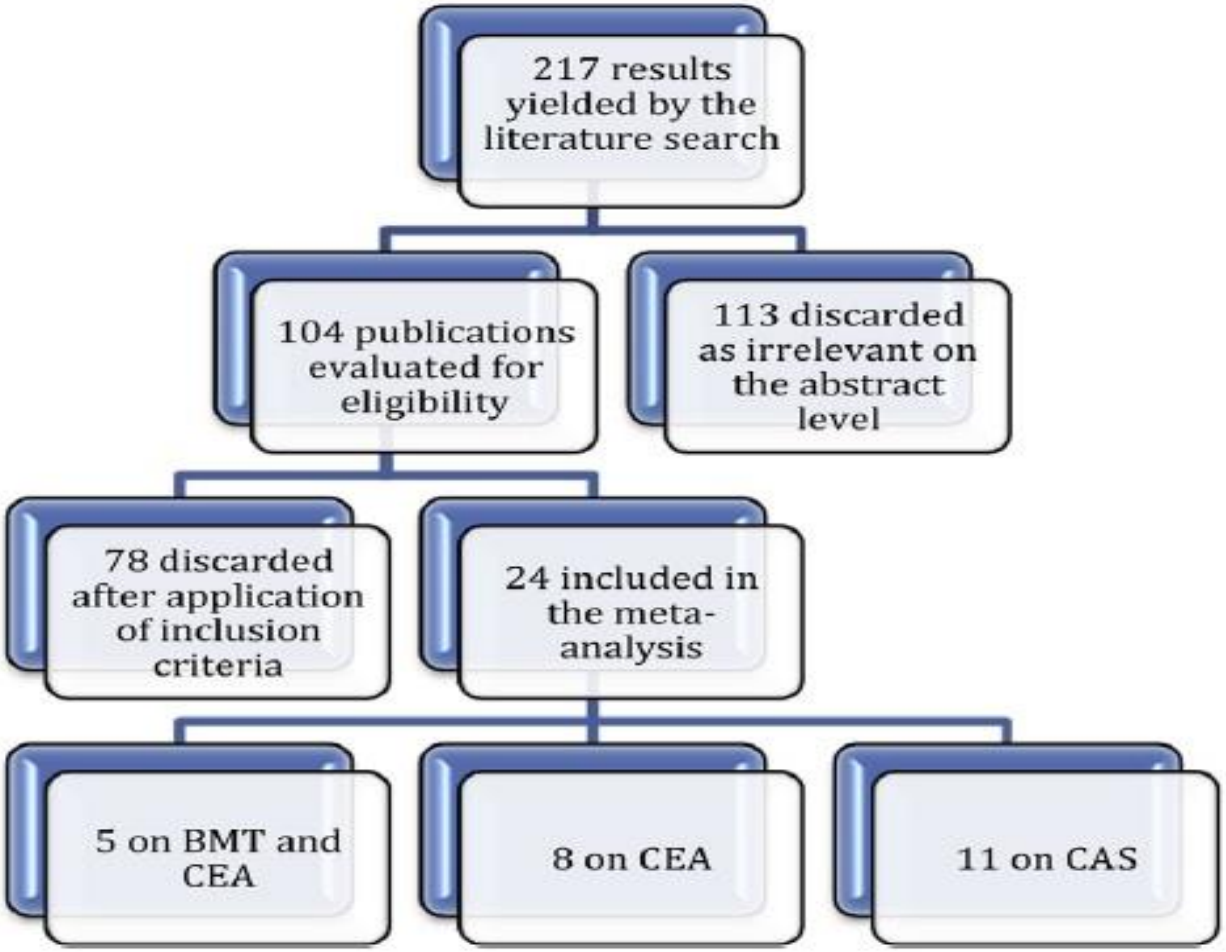
Management of Patients with Internal Carotid Artery Near-total Occlusion: An Updated Meta-analysis



S.N. Mylonas, C.N. Antonopoulos, K.G. Moulakakis, J.D. Kakisis, C.D. Liapis
Ann Vasc Surg 2015

Management of Patients with Internal Carotid Artery Near-total Occlusion: An Updated Meta-analysis

CEA
15 studies,
774 patients

Author, year	CEA (n)
Ogata, 2011	28
Radak, 2010	259
Bowman, 2009	1
Fox, 2005	148
Greiner, 2004	40
Ascher, 2002	12
Samson, 1999	5
Pulli, 1997	24
Regina, 1997	15
Kniemeyer 1996	76
Archie, 1994	17
Berman, 1994	91
Fredericks, 1990	26
O'Leary, 1989	25
Ringelstein, 1983	7

CAS
10 studies,
342 patients

Author, year	CAS (n)
Ruiz-Salmerón, 2013	54
Sakamoto, 2013	14
Son, 2013	24
Spacek, 2012	19
Gonzalez, 2011	116
Barker, 2010	9
Choi, 2010	48
Razuk, 2010	13
Nikas, 2010	25
Terada, 2006	20

BMT
5 studies,
186 patients

Author, year	BMT (n)
Radak et al 2010	50
Bowman et al, 2009	8
Fox et al, 2005	114
Ascher et al, 2002	5
O'Leary et al, 1989	9

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Ann Vasc Surg 2015

ICA near total occlusion
Should we treat? CEA or BMT

Risk of stroke

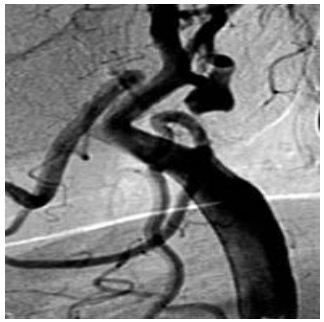
Crude Incidence Rates

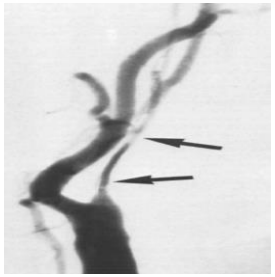
Incidence Rates per year

P<0.01

CEA 5.5%

BMT 14%

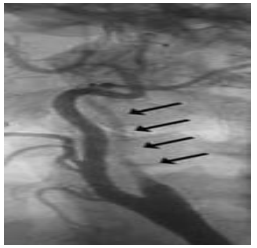




P<0.01

CEA 2.2%

BMT 6.2%



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ICA near total occlusion
Should we treat? CAS or BMT

Risk of stroke

Crude Incidence Rates

Incidence Rates per year

P<0.01

CAS 4.4%

BMT 14%

P<0.01

CAS 1.8%

BMT 6.2%

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ICA near total occlusion

Results of meta-analysis on CAS and CEA

Crude Incidence Rates (%)

Outcome	CAS	CEA	p value
	% (95%CI)	% (95%CI)	
TIA	2.1 (0.9-3.8)	3.5 (1.4-6.6)	0.35
Stroke	4.4 (2.5-6.8)	5.5 (2.8-9.0)	0.58
Stroke-related Death	1.5 (0.5-3.0)	1.9 (0.7-3.6)	0.72
MI	3.1 (1.5-5.1)	2.5 (1.0-4.7)	0.65
Overall Mortality	9.3 (6.5-12.6)	6.4 (2.6-11.84)	0.31
MAE	8.4 (5.7-11.5)	7.3 (4.0-11.53)	0.64
Restenosis	**4.4 (2.5-6.8)**	**13.0 (5.4-23.4)**	**0.03**

No differences in TIA, Stroke, Stroke-Related Death, MI, Mortality, MAE

Significantly lower restenosis after CAS, compared to CEA

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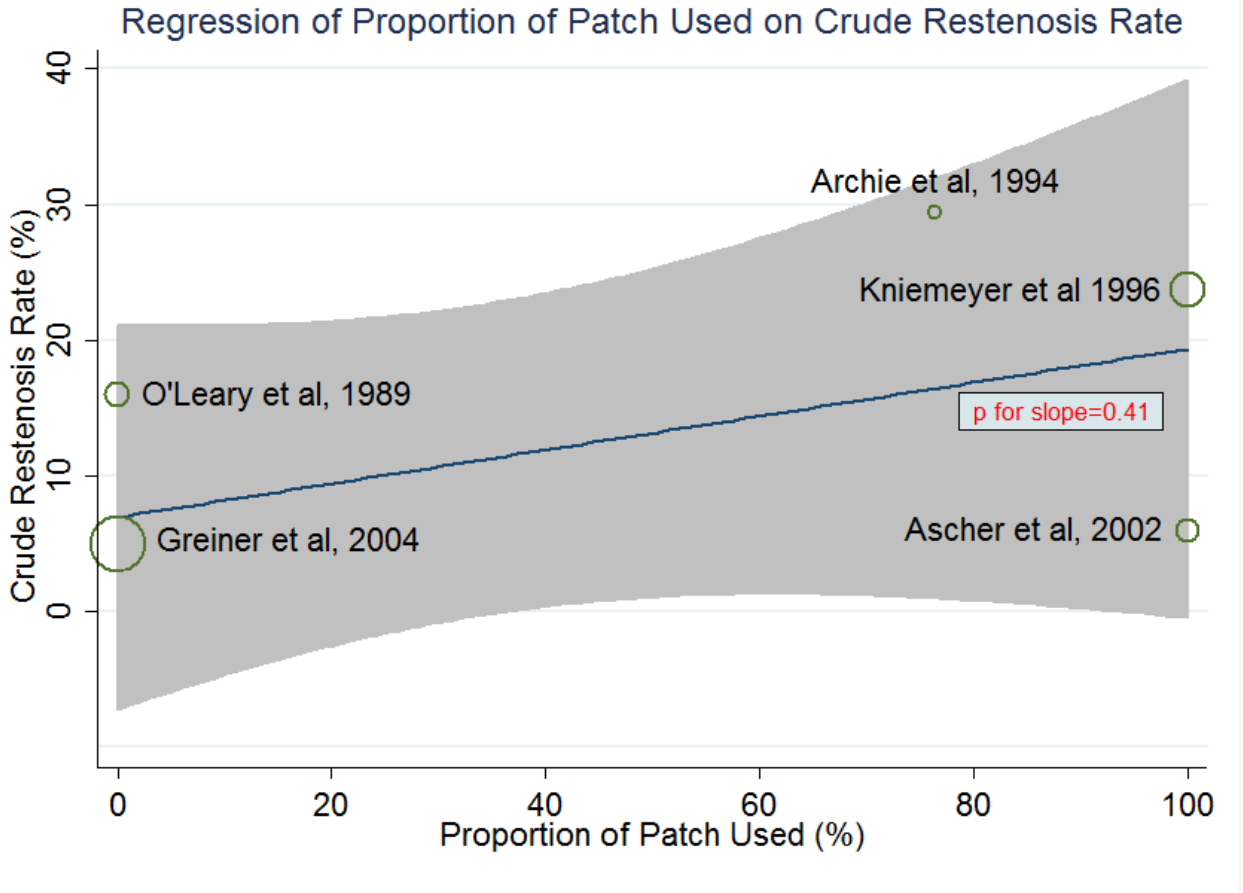
Possible moderators of Restenosis Rate

The effect of patch



No significant effect of the use of patch on Restenosis after CEA

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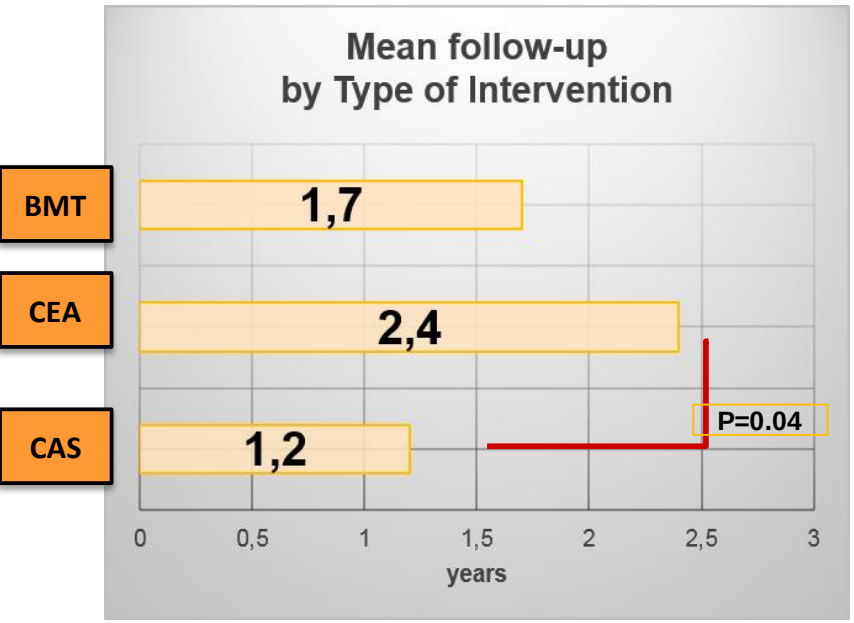
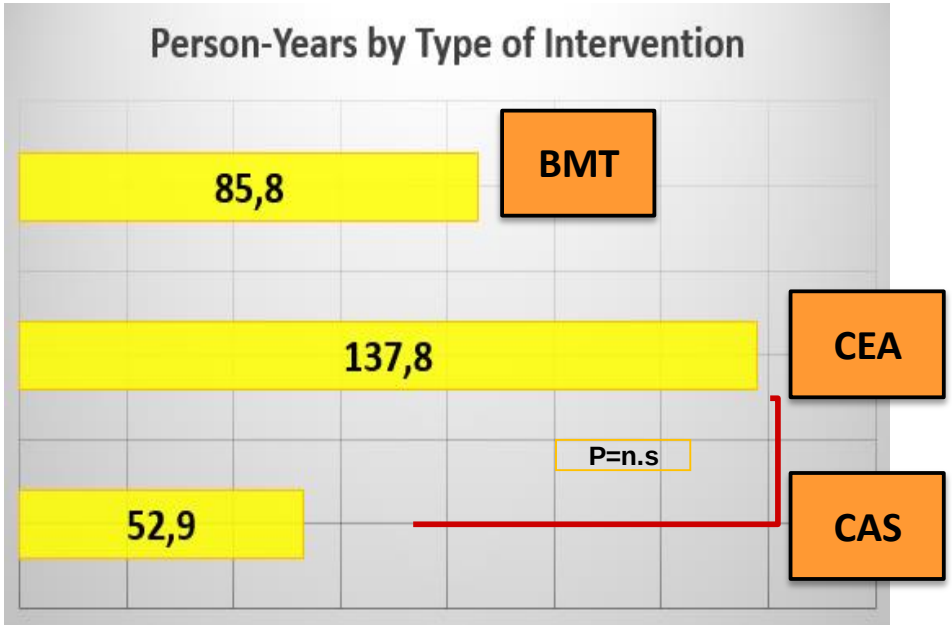
Possible moderators of Restenosis Rate:
Duration of follow-up





Patients treated with CEA had significantly longer follow-up

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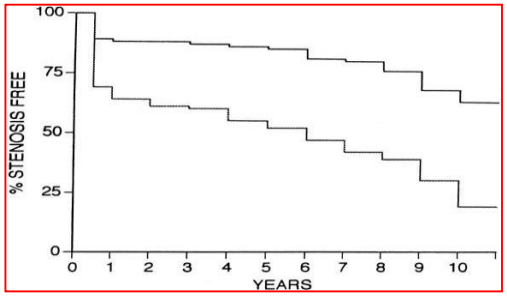
Meta-analysis: ICA near total occlusion

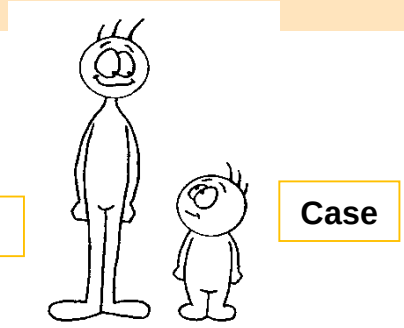
Small, Retrospective

No report on time between operation and restenosis for all studies

Limitations of included studies



Absence of control group



Selection bias

Short duration of follow-up

Different Definitions of near occlusion

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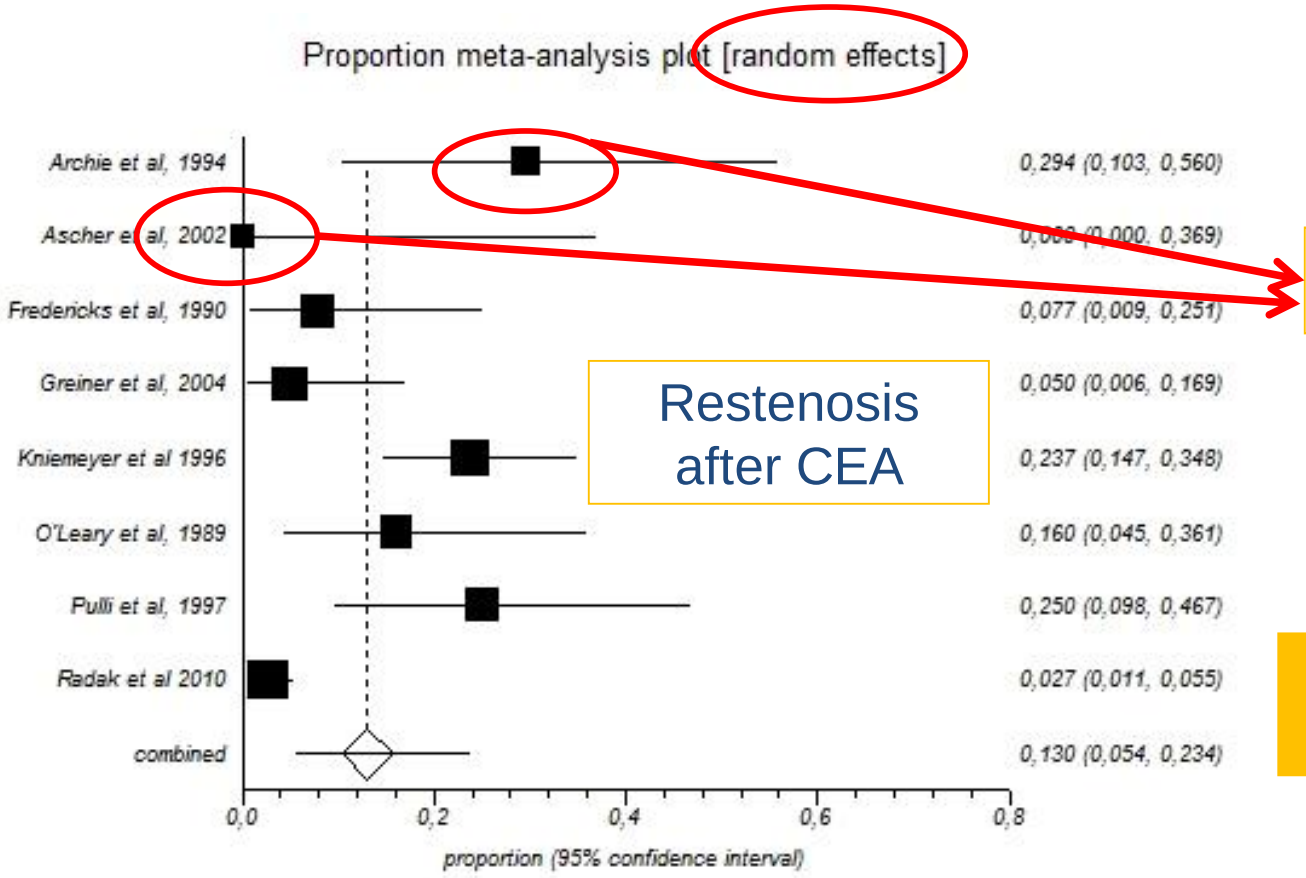
ICA near total occlusion

Limitations of meta-analysis



Restenosis after CEA

Outliers ?

Heterogeneity

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Endovascular Treatment for Near Occlusion of the Internal Carotid Artery : 30-Day Outcome and Long-Term Follow-Up

MATERIAL AND METHODS:
Between 2004-2014 a total of 182 patients with ICA NO were evaluated for CAS. The study included 132 male (72.5 %) and 50 female (27.5 %) patients with a mean age of 70.2 years. Of the patients 80 (44 %) were asymptomatic. The median clinical and carotid Doppler ultrasound (DUS) follow-up period was 64 months (range 18-124 months).

RESULTS: Technical success 100% !!
4 patients (2.2 %) developed minor stroke, 2 patients (1.1 %) developed myocardial infarction but no major stroke or death occurred in the following 30-day period. Asymptomatic restenosis was detected in seven patients (3.8 %).

CONCLUSION:
With sufficient neurological evaluation during pretreatment and post treatment and when the procedure is performed with technologically developed products by an experienced interventional team, CAS is beneficial in patients with ICA NO

Akkan K. et.al Clin Neuroradiol. 2016

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Conclusions

ICA near total occlusion is a frequent finding with a reported potential to progress to total occlusion up to 40% per year and with an incidence of stroke up to 6% per year

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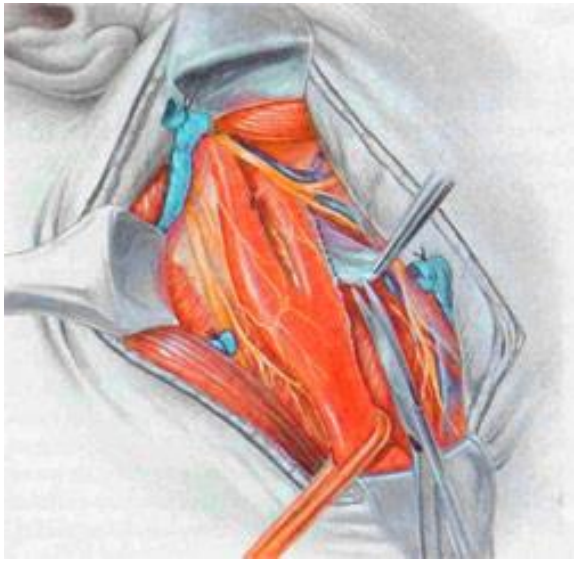
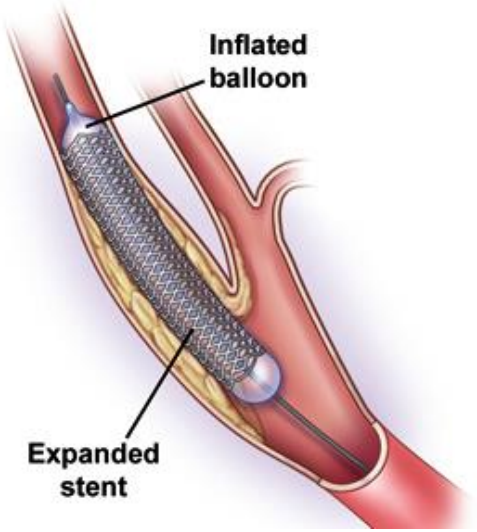
Conclusions

Our meta-analysis evidenced that BMT presents increased Stroke Incidence Rates, compared to CEA or CAS !!!





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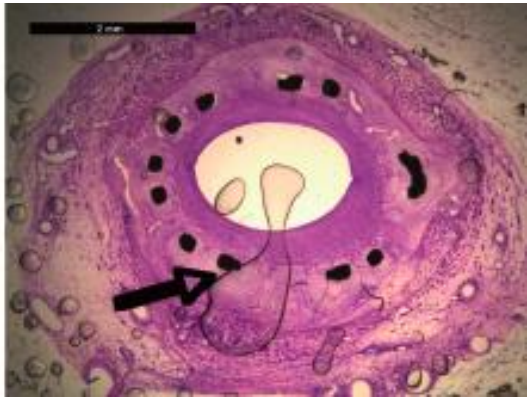
Conclusions

Literature review indicates similar stroke rates and significantly lower restenosis during short-term follow-up after CAS, compared to CEA



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Conclusions

We must include patients with ICA near total occlusion in the RCTs

In the meantime

Surgical treatment of patients with carotid near total occlusion is justified on a selected basis.

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Thank you for your attention

Athens 10/1/2017