RUTGERS
UNIVERSITY | NEW BRUNSWICK

Emergent Revascularization for Symptomatic Carotid Artery Occlusion

Is it time to open up carotids that are 100% occluded

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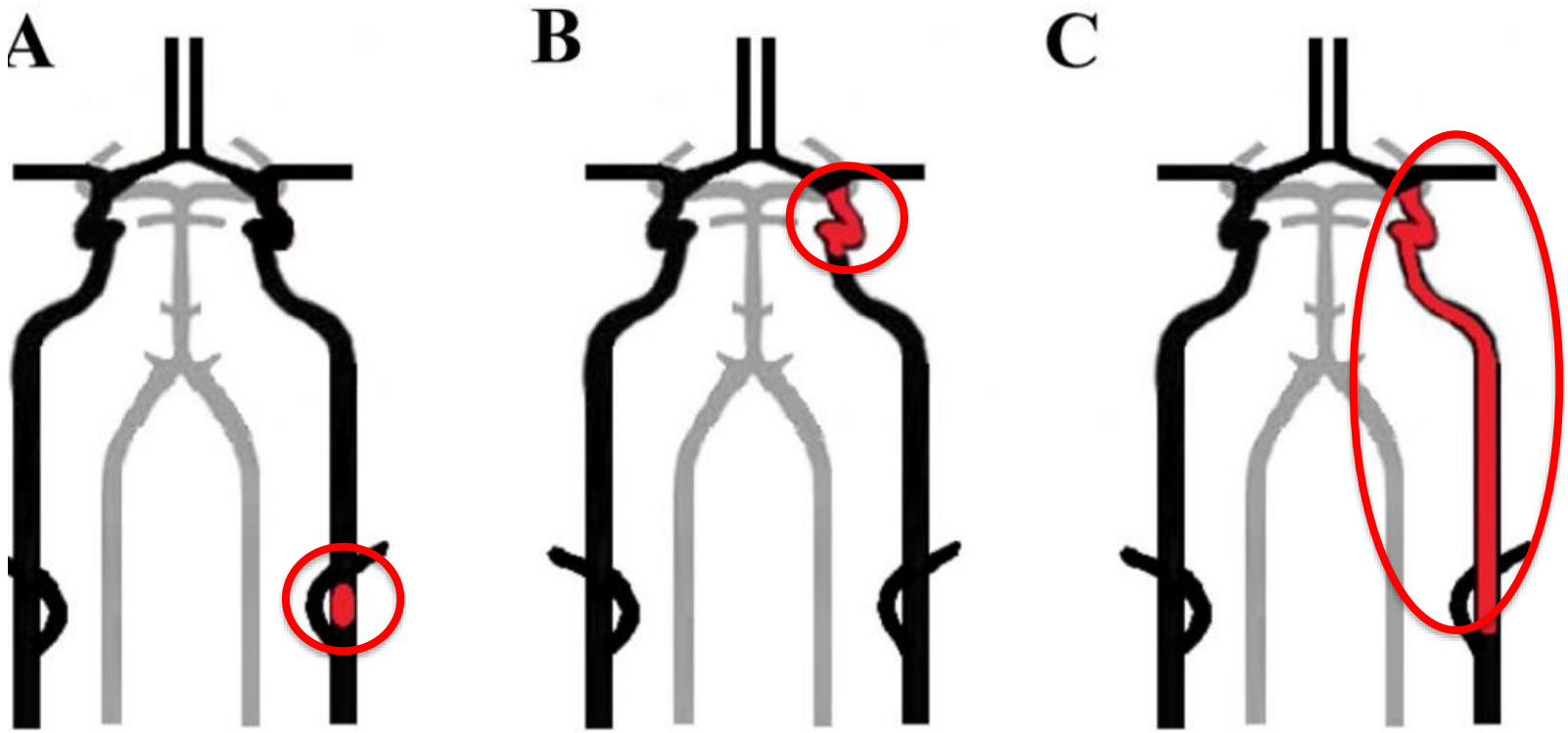
(Nourollah-zadeh)

Neuro-Interventional & Neuro-Critical Care

Definition

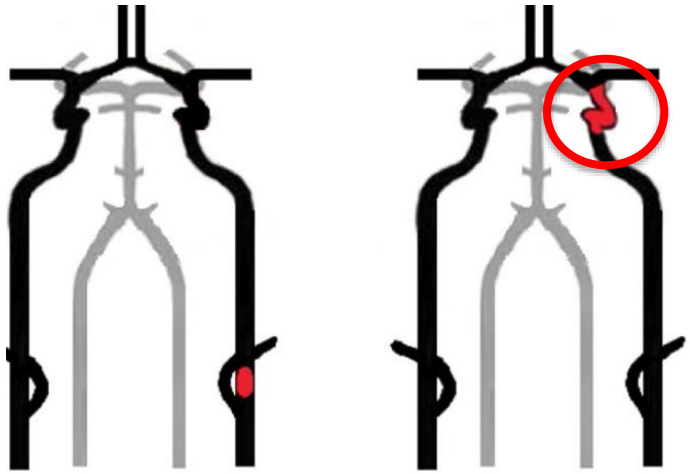
- Cervical (Extracanial)
- Carotid- I

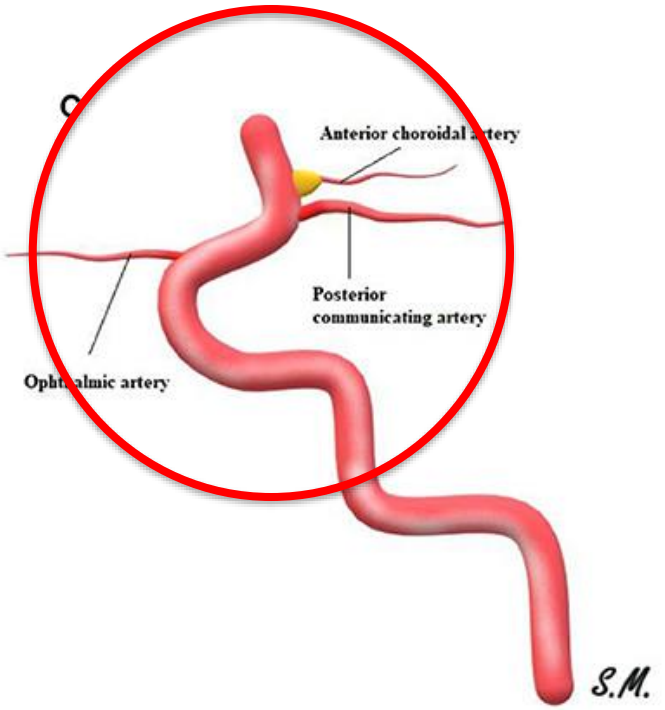


Epidemiology

Incidence of symptomatic ICA-O among Stroke pts?

- Cervical ICA?
  - 8% in TOAST trial (95/1281)
- Carotid-I occlusion?
  - 3% (in MERCI and MULTI-MERCI trials)

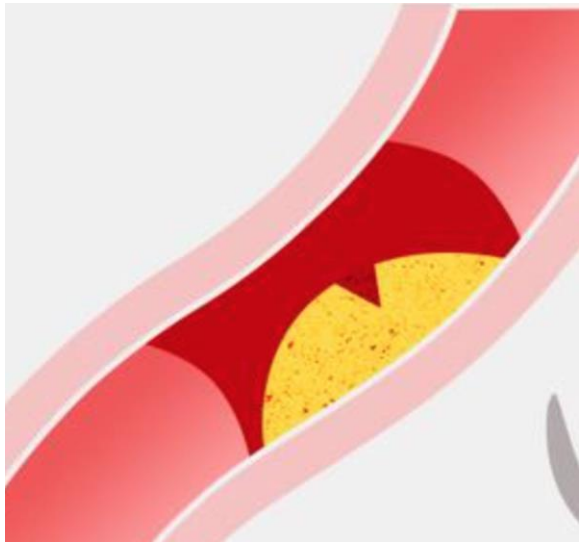




Pathophysiology

- Plaque rupture → occlusive thrombus (~STEMI)
- Hemodynamic failure (inadequate collateral flow)

~ 85% Athero

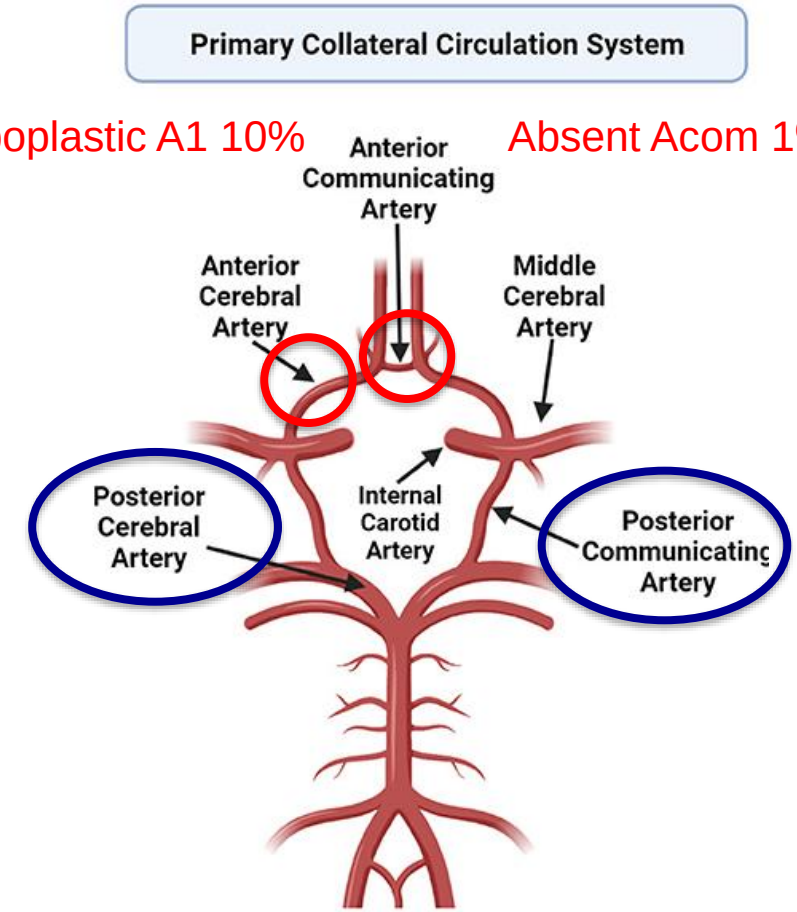


How often ICA-O is symptomatic?

Most can tolerate ICA-O but….

- ***Acute stroke ~ 25%***
- TIA ~ 16%
- Asymptomatic 54%

Why some can not tolerate ICA-O?



Absent/Hypoplastic Pcom 30%

Symptomatic ICA-O: Natural History (TOAST)

- Death in 20%
- Significant disability in 40%
- Annual Stroke rate 10-20%

Neurologic sequelae of unilateral carotid artery occlusion: Immediate and late

Stephen C. Nicholls, MD, Robert Bergelin, MS, and D. Eugene Strandness, MD,
Seattle, Wash.

(J VASC SURG 1989;10:542-8.)

Short-Term Outcomes After Symptomatic Internal Carotid Artery Occlusion

Matthew J. Burke, BSc; Mervyn D.I. Vergouwen, MD, PhD; Jiming Fang, PhD;
Rick H. Swartz, MD, PhD; Moira K. Kapral, MD, MSc; Frank L. Silver, MD;
Leanne K. Casaubon, MD, MSc; on behalf of the Investigators of the Registry of the Canadian Stroke Network

DOI: 10.1161/STROKEAHA.111.615278

Antithrombotic treatment of ischemic stroke among patients with occlusion or severe stenosis of the internal carotid artery

A report of the Trial of Org 10172 in Acute Stroke Treatment (TOAST)

Neurology® July 01, 1999; 53 (1)

Symptomatic ICA-O: Acute medical tx?

- tPA ?
  - Doesn't work

Occlusion Location	Recanalization (All)	Recanalization After IV rt-PA
M1-MCA	75.4% (49)	32.3% (21)
ICA terminus (T, L) occlusion	43.5% (10)	4.4% (1)

Low Rates of Acute Recanalization With Intravenous Recombinant Tissue Plasminogen Activator in Ischemic Stroke

Real-World Experience and a Call for Action

Stroke

Volume 41, Issue 10, 1 October 2010; Pages 2254-2258

Why consider EVT?

If patient presents with **stroke symptoms**, ICA-O is **NOT benign**

How often does their exam worsen early on?

- 20-30% of symptomatic ICA-O

Does EVT work for ICA-O?

- Successful recanalization rate? ~ 90%
- Good functional outcome at 3 months? 65%

Table 3 Stenting and angioplasty studies of acutely symptomatic carotid occlusions

Study	N	Embolic protection device (EPD)	Onset to treatment	Recanalization	mRS (0–2)
Jovin[6]	25	4% (distal EPD)			
Hauck[25]	22	Not reported (proximal aspiration)	<24 hours	77%	50%
Current study	107	65% (distal EPD)	Hours to days	92%	65%

Stratification based on presenting NIHSS score of ≥6	Endovascular therapy (n=40)	Medical therapy (n=33)	Value
Good outcome at 3 mo when initial NIHSS score ≥6	22/33 (66)	2/11 (18)	OR, 9.0 (95% CI, 1.65–49.0)
Good outcome at 3 mo when initial NIHSS score <6	7/7 (100)	18/22 (82)	OR, 3.6 (95% CI, 0.17–76.5)

Endovascular Therapy Versus Medical Therapy for Acute Stroke Attributable to Isolated Cervical Internal Carotid Artery Occlusion Without Intracranial Large Vessel Occlusion

Michael J. Waters, MBBS; Patrick McMullan, MBBS; Peter J. Mitchell, MBBS, MMed; Timothy J. Kleinig, MBBS, PhD; Leonid Churilov, PhD; Rebecca Scroop, MBBS; Richard J. Dowling, MBBS; Steven J. Bush, MBBS; Minh Nguyen, MBBS; Bernard Yan, MBBS, PhD

Stroke Vasc Interv Neurol. 2022;2:e000174.

Angioplasty and stenting for symptomatic extracranial non-tandem internal carotid artery occlusion

Ashutosh Jadhav,[1,2] David Panczykowski,[2] Mouhammad Jumaa,[3] Amin Aghaebrahim,[4] Manasa Ranginani,[1] Felix Nguyen,[2] Shashvat M Desai,[1] Ramesh Grandhi,[5] Andrew Ducruet,[6] Bradley A Gross,[1,2] Brian Thomas Jankowitz,[1,2] Tudor G Jovin[1,2]

Jadhav A, *et al*. *J NeuroIntervent Surg* 2018;**10**:1155–1160.

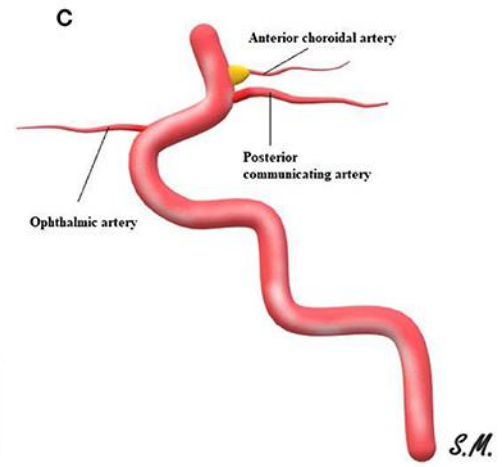
True Chronic carotid occlusion

- 20 pts (2018-21)
- Indication: recurrent stroke, hemodynamic impairment
- Success in 80%
- Complications 30%, permanant morbidity was 5%

Modern endovascular management of chronic total carotid artery occlusion: technical results and procedural challenges

Răzvan Alexandru Radu [1,2] Federico Cagnazzo [1] Imad Derraz [1] Cyril Dargazanli,[1] Francesca Rapido,[3] Pierre-Henri Lefevre [1] Grégory Gascou [1] Vincent Costalat[1]

How do we decide on EVT?



- Clinical exam / Disabling symptoms
- CTA? Anatomy of collaterals on CTA
  - COW complete?
  - Contralateral stenosis (ICA and/or A1)
  - Is ICA occluded at the Ophthalmic artery or Anterior Choroidal?
- CTP?
  - In one study, hypoperfusion was seen 76% of the time
  - MTT or Tmax?
- Cerebral Angio?

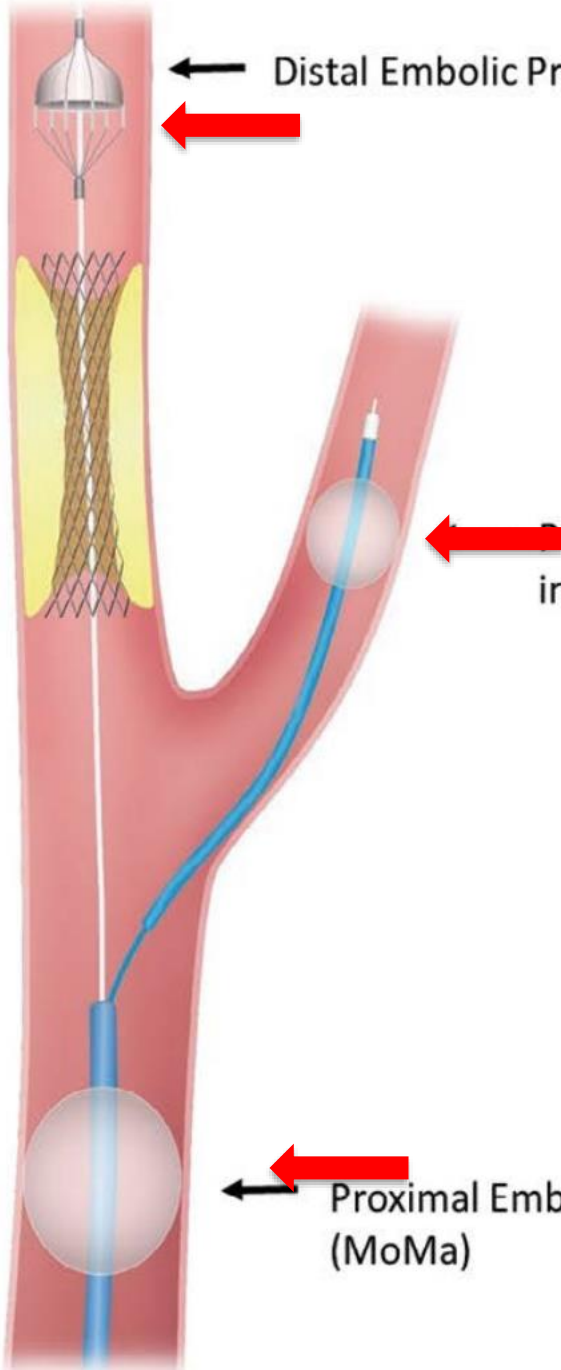
How to minimize complications?

Technique; is it optimized?

- Balloon guide catheters? Distal embolic Filter?
- Heparin? DAP, Cangrelor?

Adequacy of collateral pathways?

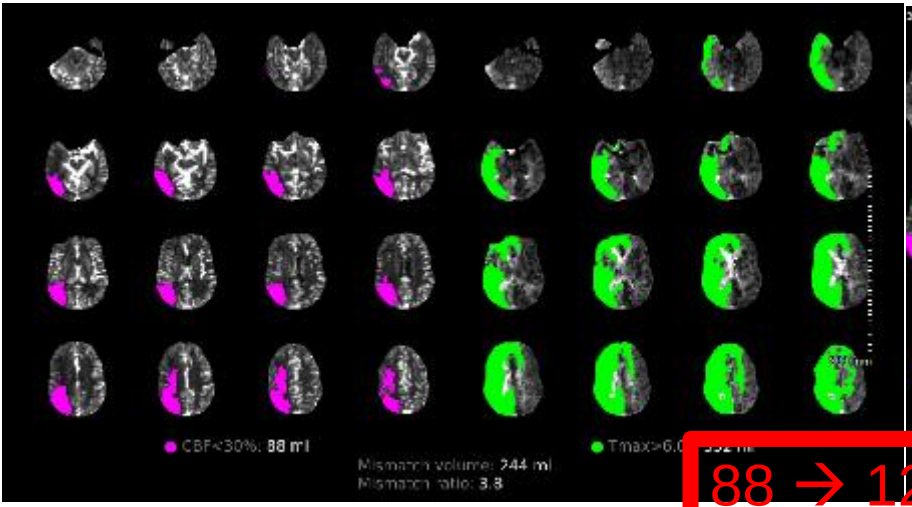
- Absent Acomm, A1 stenosis?
- Contralateral ICA stenosis
- DWI/Flair or CTP mismatch?

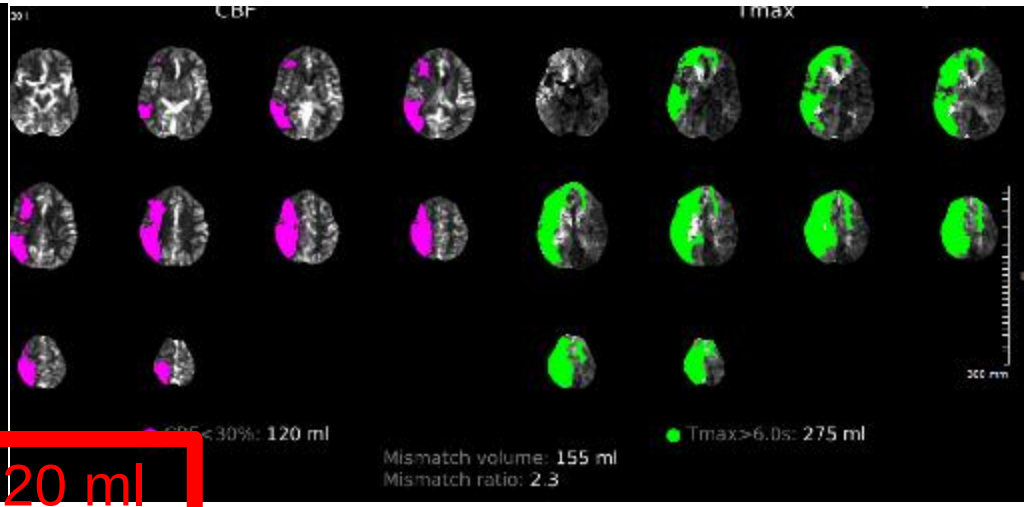


Case 1

Should we open the carotid?

- 52 yo M with hx of HLD, GI bleed, thyroid Ca was admitted with
  - Left sided weakness; CTH/CTP at 8:42 am at OSH.
    - NIHSS 11
  - CTP repeat at 11 am upon arrival
    - NIHSS 11 → 20


CBF<30%: 88 ml
Mismatch volume: 244 ml
Mismatch ratio: 3.8


CBF
Tmax
CBF<30%: 120 ml
Tmax>6.0s: 275 ml
Mismatch volume: 155 ml
Mismatch ratio: 2.3

88 → 120 ml

Case 2

- This is a 27 yo male who was admitted after crashing into a truck with left sided weakness, right gaze preference

Should we open the carotid?

THANK YOU