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Navigating Intraluminal Thrombi in Acute Stroke

Hannah Irvine Russell, MD
Assistant Professor of Neurology
The Warren Alpert Medical School of Brown University
Vascular Neurologist
Comprehensive Stroke Center at Rhode Island Hospital
Providence, RI

Financial Relationship Disclosure(s)

Hannah Irvine Russell, MD

- Nothing to disclose

Overview

- Case
- What is ILT
  - Imaging characteristics
  - Clinical characteristics
- Current practice patterns in management of ILT
- Evidence for management if ILT
- Conclusions

Case: MP

60 year old male presented with sudden onset word finding difficulty.

PMH of HTN, HLD, CAD s/p CABG.

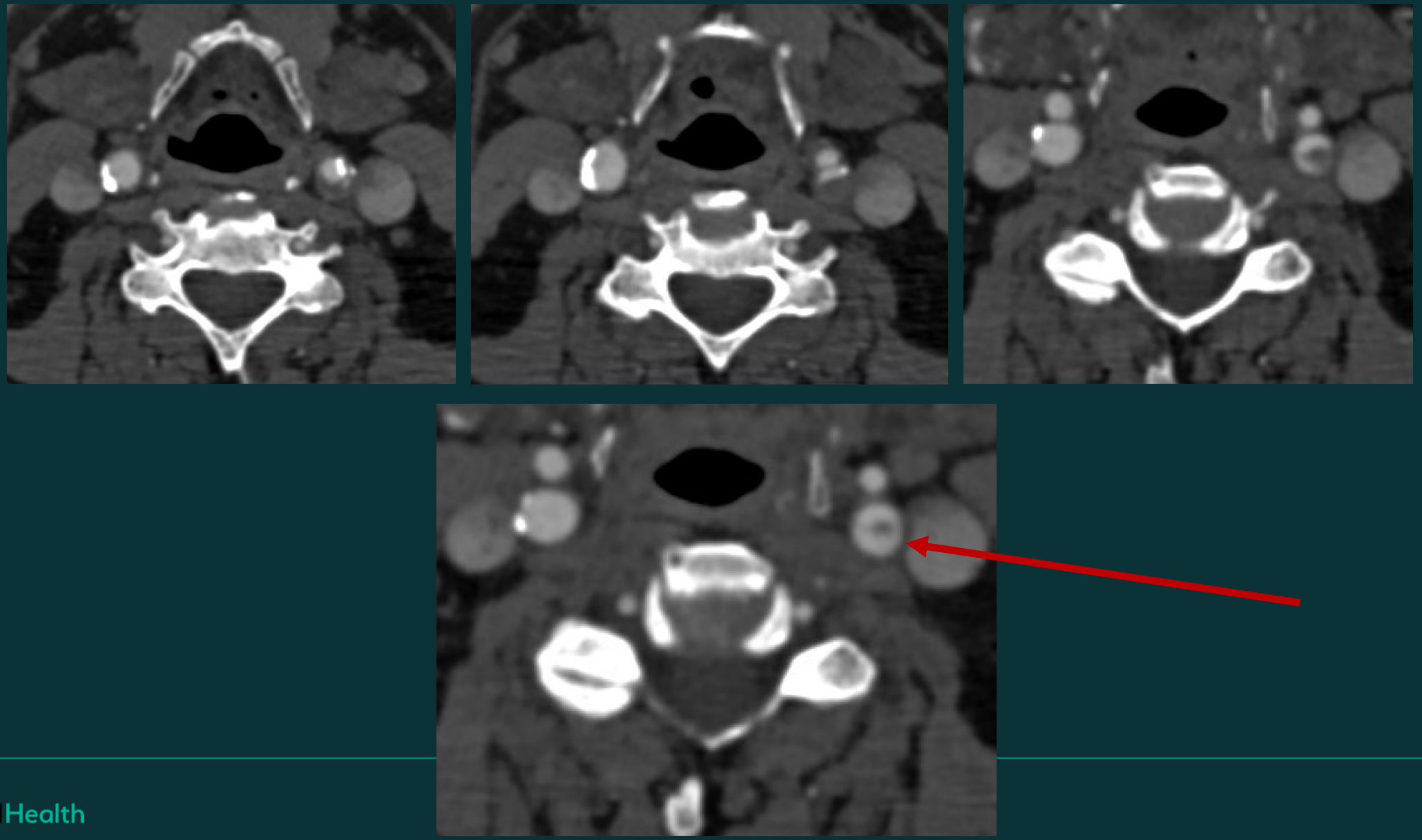
NIHSS 2 for WFD and mild R facial weakness.

No TNK given last known well > 4.5 hours.

Home meds: aspirin, atorvastatin 80mg daily, zetia 10mg, losartan, metoprolol

CTA…

Case: MP



Case: MP

LDL 59 (139 at time of MI in 2014)

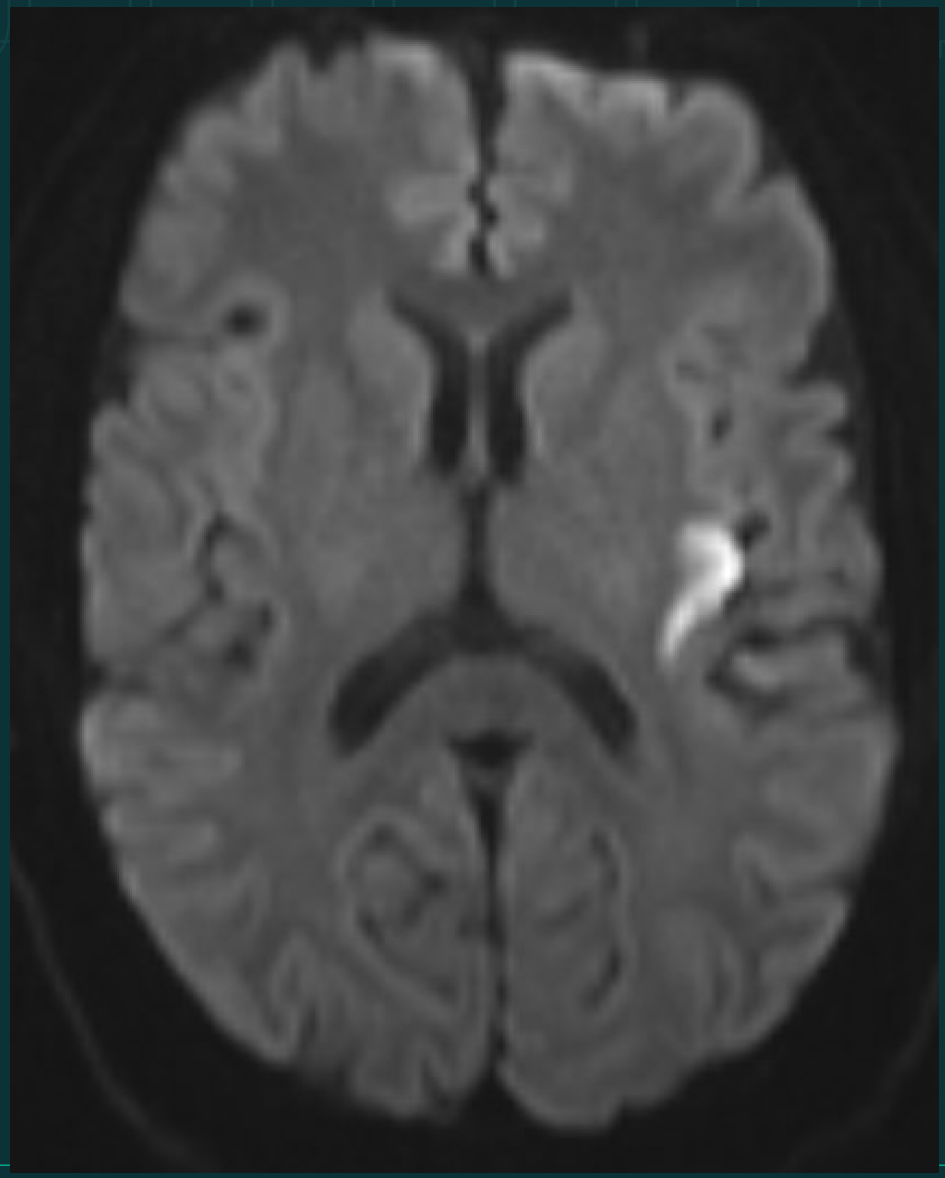
A1c 5.6

Lipoprotein (a) **142**

TTE unremarkable

MRI with small insula and corona radiata strokes

Treated with DAPT initially



What is an intraluminal thrombus (ILT)?

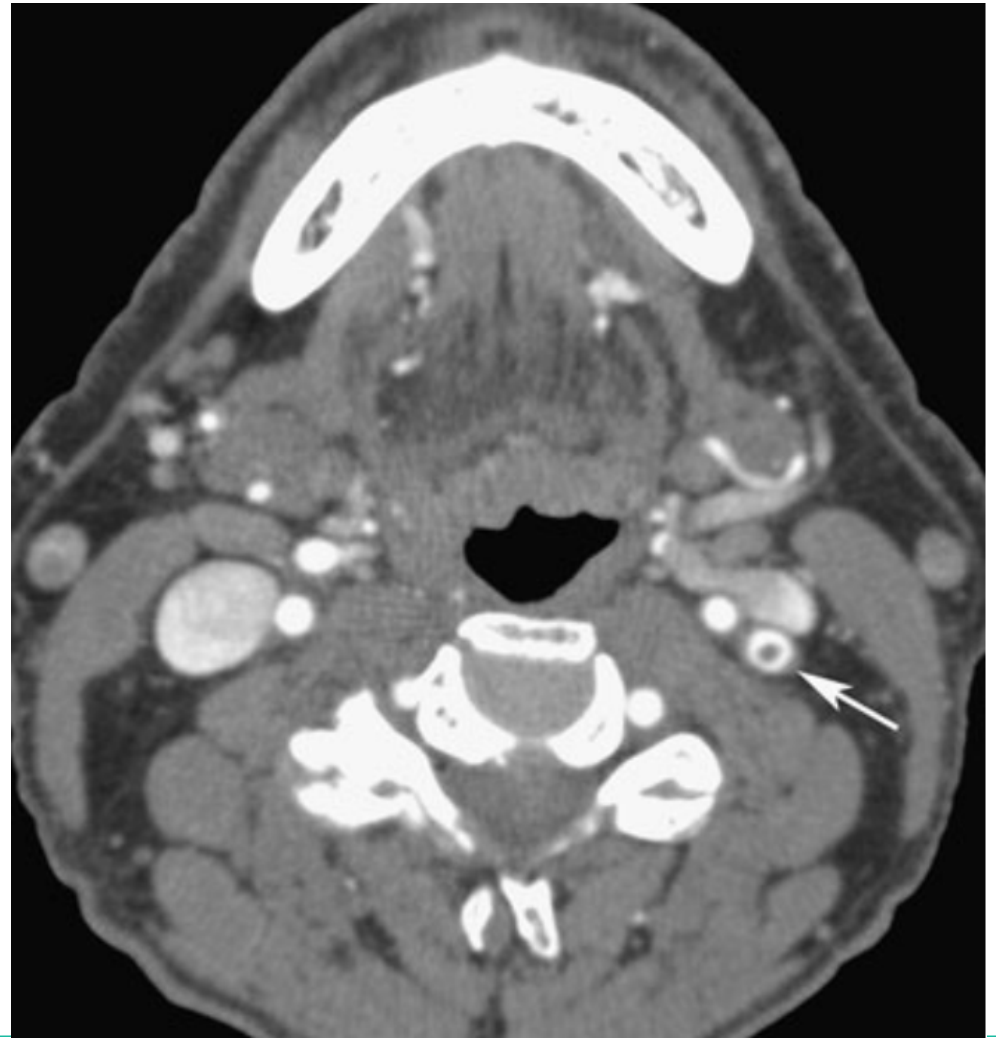
ILT = blood clot attached to the arterial wall with surrounding blood flow at its distal component

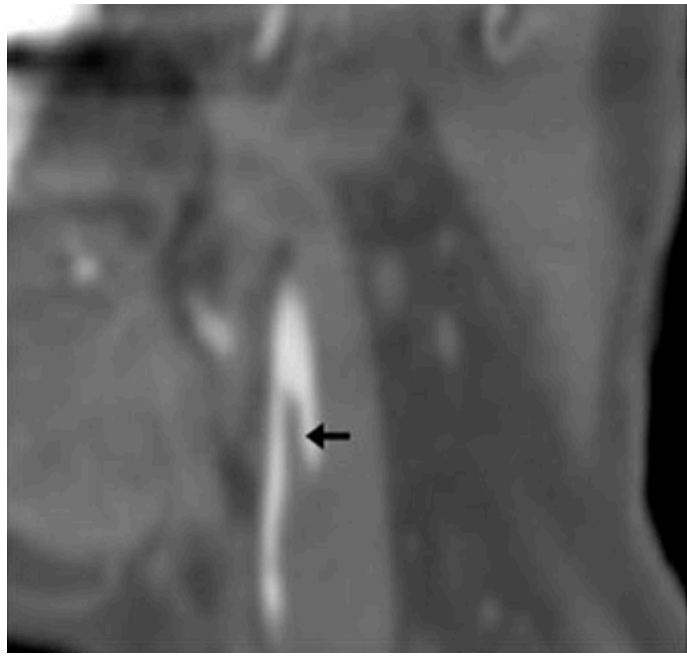
Donut sign (axial) or **finger sign** (sagittal)

= central filling defect circumferentially surrounded by contrast on at least 2 contiguous axial images

→ distal tip of the thrombus surrounded by blood flow

Finger sign extending >3.8mm cranially in ICA has 88% sensitivity, 86% specificity for ILT (vs. complex ulcerated plaque)





Clinical characteristics of ILT in stroke

Cervicocephalic ILT present in **1.6-3%** of all stroke patients
(increasing prevalence with increasingly widespread use of CTA/MRA)

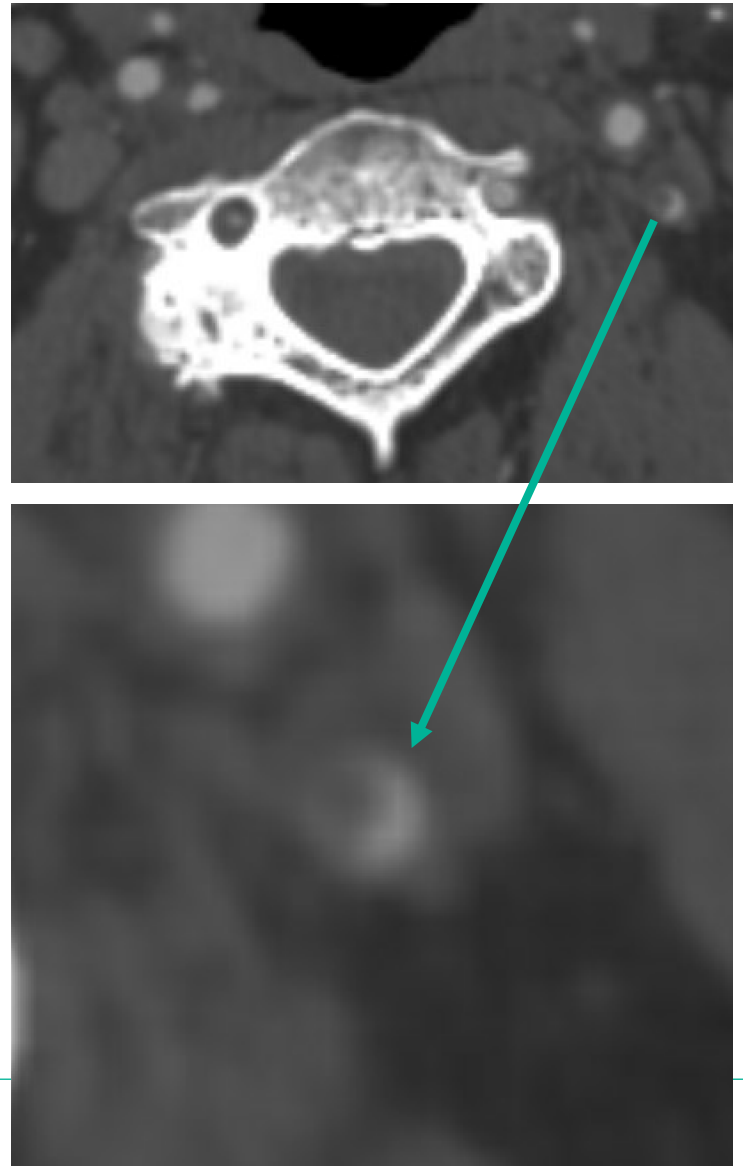
65% extracranial ICA
11.5% extradural vertebral artery
15% intracranial vessels

- 6.6% intracranial ICA
- 3.3% basilar
- 3.3% intradural V4
- 1.6% MCA

Mean age 58-69

Males > females (2:1)

Associated with active smoking



Clinical characteristics of ILT in stroke

Etiology:

- **Atherosclerosis** is the most common (>50%)

- Hypercoagulability of malignancy
- Thrombophilia
- Pregnancy
- Pro-inflammatory state
- COVID-19
- FMD, dissections, carotid webs

NASCET	
ICA Stenosis	Incidence of ILT
<70	1.1%
≥70%	4.3%
≥85%	5.5%

High short-term risk of recurrent ischemic events

Risk of early stroke recurrence with ILT

Study	Study type	Number of patients	Recurrent stroke risk
Muller et al. *Frontiers Neurology, 2022.*	Single center, retrospective	62 patients with ILT on CTA, MRA or DSA	19.7% recurrent stroke within 7 days 27.4% risk within 3 months
Fridman et al. *Internat J of Stroke. 2019*	Systematic lit review	345 patients with ILT 1960-2017 (CTA, MRA, CUS or DSA)	17.1% risk of recurrent stroke, TIA, silent infarct or death within 30 days 11.1% risk of stroke or death
Jayyusi et al,. *Brain Sci. 2024*	Systematic lit review	69 patients with ILT 1992-2023	11.2% risk of recurrent stroke or TIA (85% TIAs), median follow-up 7 months

Case: MP

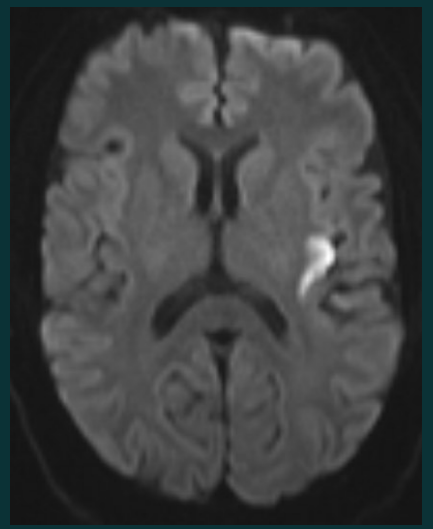
Pt suffers acute neuro- deterioration on hospital day 1. Has new L MCA syndrome and NIHSS 24.

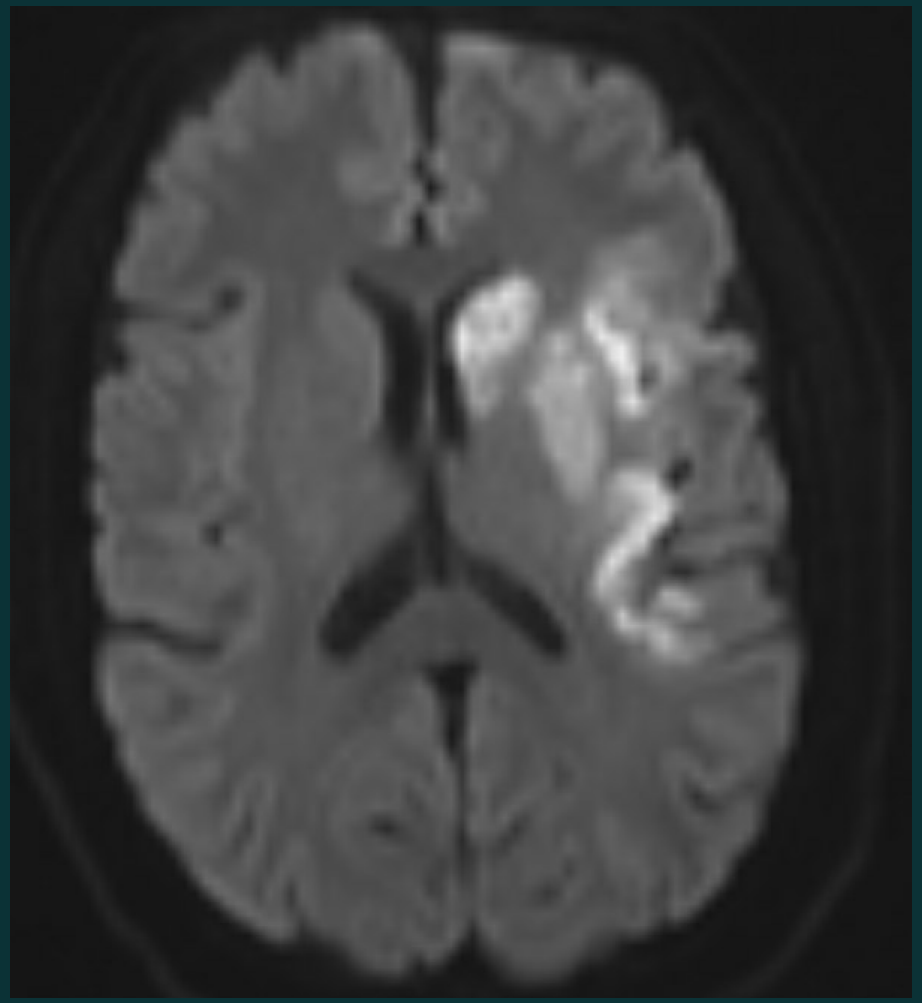
Repeat NCHCT/CTA shows new acute L M1 occlusion.

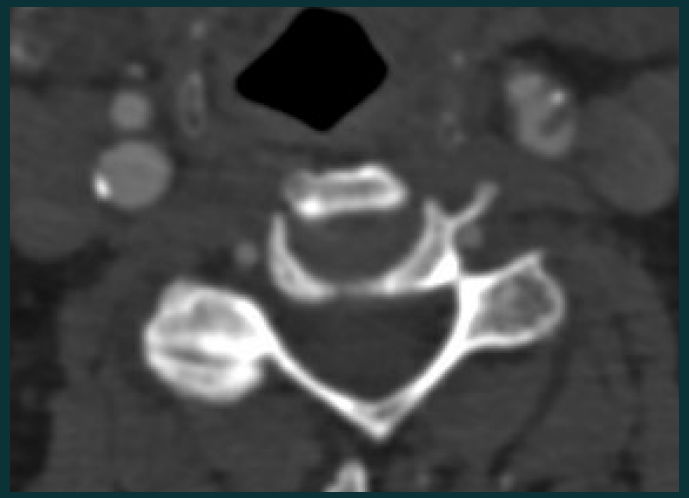
Case: MP

TICI 3 MT

Residual L ICA ILT







Management of ILT in stroke – state of current practice

Class IV evidence only!

No randomized or comparative trials *to assess strategies of medical or surgical management of ILT to date*

Clinical equipoise

- Hyperacute management – mechanical thrombectomy

- Acute management
  - Anticoagulation vs. antiplatelet/s
  - Duration of treatment
  - Timing of repeat imaging

- Revascularization and timing of revascularization

  NASCET

  → increased risk of perioperative stroke and death in patients with ILT

  → uncertainty re: optimal timing of revascularization

  - Before widespread of dual antiplatelet therapy and modern high intensity statins
  - Unclear use of preoperative AC

Management of ILT in stroke – state of current practice

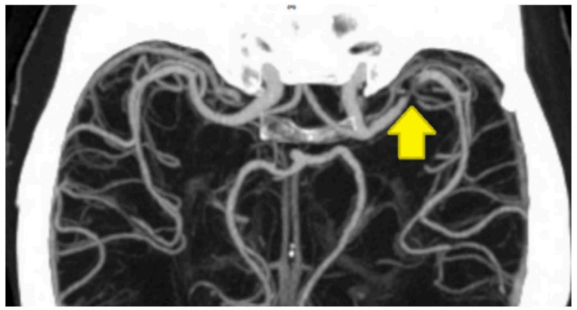
First-Line Treatment of Symptomatic Subocclusive Large-Vessel Stroke: Results of a Nationwide StrokeNet Survey

Yasmin N Aziz, MD[1], Pablo Harker, MD[1], Felipe Ayala, MD[2], Laura MC Ades, MD[3], Vaibhav Vagal, BS[4], Pooja Khatri, MD, MSc[1]

- Email survey of NIH StrokeNet regional coordinating centers (RCCs)
- 42 surveyed individuals from 25 RCCs (53% interventionalists, 38% stroke neurology)

Clinical Vignette:

Mr. Smith is a 60-year-old man who presents to the Emergency Department with word finding difficulty and right hemiparesis. He lives independently (mRS 0) and was last seen normal 5 hours ago by family. He is afebrile with a HR of 70 and a BP of 160/80. Neurologic examination is notable for NIHSS of 9. CTH shows an ASPECTS of 10, CTA shows a sub-occlusive left MCA lesion with excellent collaterals (below).



History: Last known normal (LKN) within 6 hours (LKN 5 hours)

Vitals: Hypertensive (160/80mmHg)

Exam: NIH Stroke Scale (NIHSS) >6 with disabling deficits (NIHSS 9)

CTH: No infarct on CTH (Alberta Stroke Program Early CT Score [ASPECTS] 10)

CTA: Left MCA location; Excellent collaterals (both variables displayed in CTA)

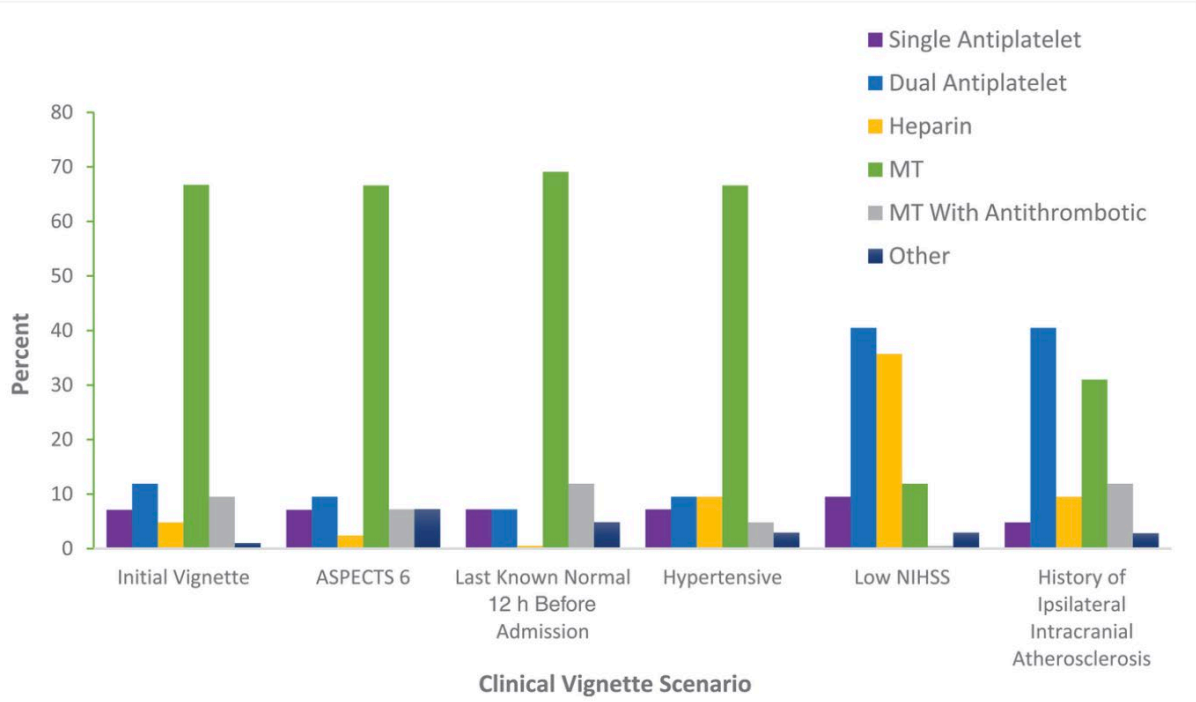


Figure 3. Initial treatment selection for anterior circulation subocclusive lesion causing acute ischemic stroke. The survey clinical vignette was followed by multiple variations to the stem question to determine if these changes would impact the choice of first-line therapy by experienced StrokeNet providers. ASPECTS indicates Alberta Stroke Program Early Computed Tomography Score; MT, mechanical thrombectomy; and NIHSS, National Institutes of Health Stroke Scale.

Aziz et al. *Stroke Vasc Interv Neurol.* 2024

Management of ILT in stroke – state of current practice

Management Approaches to Intraluminal Thrombi in Acutely Symptomatic Carotid Stenosis

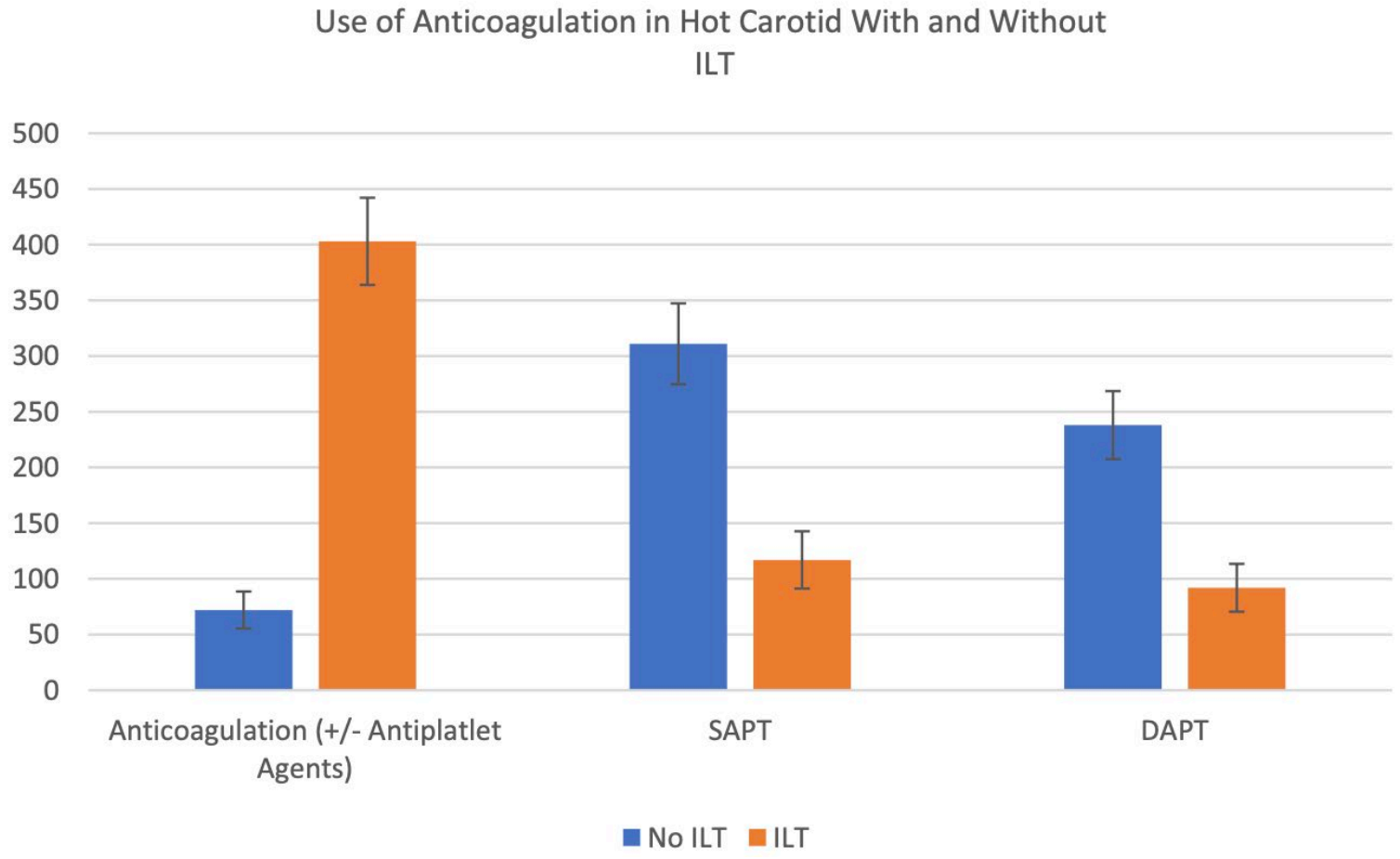
Davis MacLean[1,2], Benjamin Beland[2], Gordon A.E. Jewett[2], Luca Bartolini[3], David J.T. Campbell[1,4,5], Malavika Varma[1,2], Ravinder-Jeet Singh[6], John H. Wong[1], Bijoy K. Menon[1,4,7,8] and Aravind Ganesh[1,4,7]

Presence of ILT was associated with anticoagulation use (66% vs. 12%, *p<0.001)*

Antithrombotic use for ILT:

- 27.% heparin gtt monotherapy
- 16.1% LMWH
- 15.1% aspirin + clopidogrel
- 11.9% aspirin monotherapy
- 6.7% clopidogrel monotherapy
- 4.1% heparin + aspirin
- 9.9% other combinations

Timing of re-imaging most commonly 3-7 days.



Maclean et al, *Can. J. Neurol. Sci. 2025*

Management of ILT in stroke – systematic review of carotid ILT

Diagnosis and management of carotid free-floating thrombus: A systematic literature review

Sebastian Fridman[1], Stephen P Lownie[2] and Jennifer Mandzia[1]

58 case series, 83 case reports

525 patients with stroke and carotid ILT

345 had data about recurrent stroke within 30 days
- 17.1% risk of recurrent stroke, TIA, silent infarct or death within 30 days
- 7.5% risk of recurrent stroke
- Median time to recurrent stroke – 2 days

Predictors of recurrent stroke/TIA, silent infarct or death:
- AF
- Smoking
- Year of publication
- tPA administration

Table 4. Cox regression model for silent ischemia, TIA, any stroke or death at 30 days

	Hazard ratio (95%CI)	P value
Atrial fibrillation	9.87 (1.43–67.96)	0.02*
Current smoking	8.45 (2.25–31.83)	0.002*
CHA_2-DS_2-VASc	1.23 (0.83–1.84)	0.304
Early intervention	0.78 (0.24–2.57)	0.688
Anticoagulation	1.21 (0.35–4.23)	0.762
Year of publication	0.91 (0.86–0.96)	0.001*
Intravenous rt-PA	14.79 (3.41–64.25)	<0.0001*
Ischemic stroke (qualifying event)	1.26 (0.34–4.75)	0.731

rt-PA: IV tissue plasminogen activator.
*p-value < 0.05.

Fridman et al. *J of Internat Stroke. 2019*

Management of ILT in stroke – systematic review of carotid ILT

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Sebastian Fridman[1], Stephen P Lownie[2] and Jennifer Mandzia[1]

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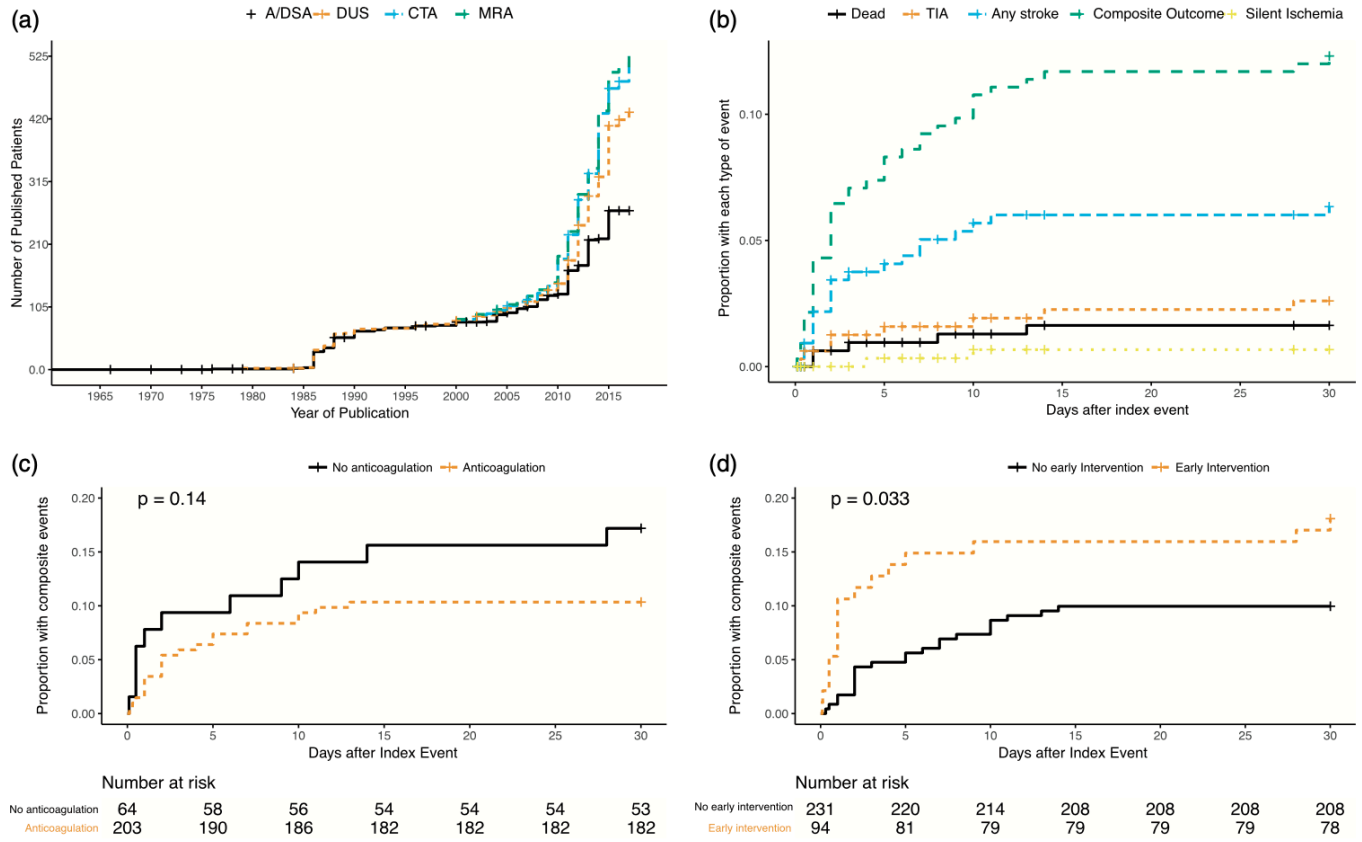
525 patients with stroke and carotid ILT

345 had data about recurrent stroke within 30 days

Anticoagulation was not associated with lower risk of stroke/TIA, silent infarct, death

Early surgical revascularization (<72 hours) was associated with higher risk of stroke/TIA, silent infarct or death in univariate analysis (HR 1.94, *p*=0.03) but not in multivariate (HR 0.78, *p*=0.69)

Figure 2. (a) Number of cases published by year and method of diagnosis, (b) Kaplan–Meier failure plot for 30-day outcomes, (c and d) Kaplan–Meier failure plot for primary outcome, (c) Plot by anticoagulation treatment, and (d) Plot by the timing of intervention.

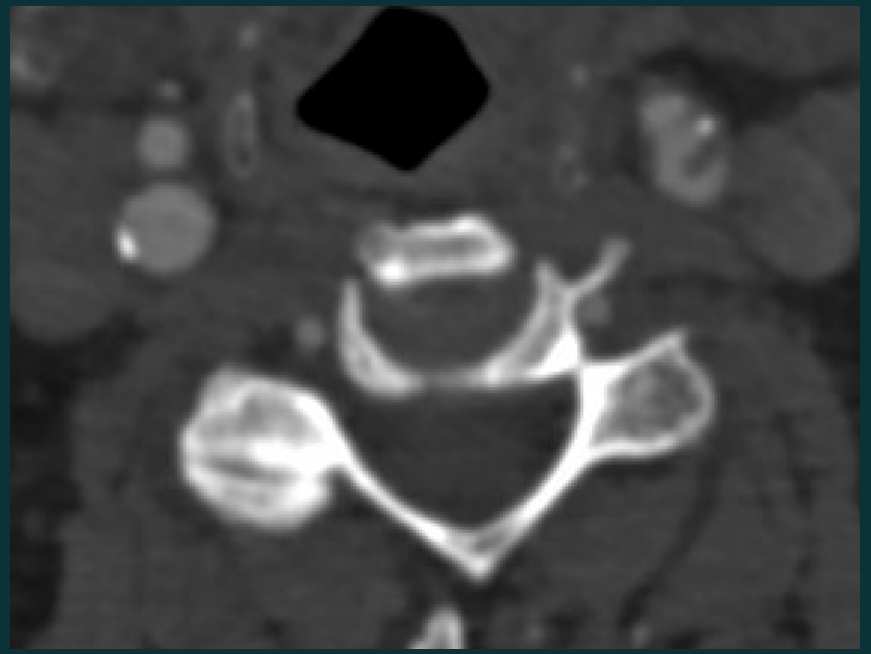


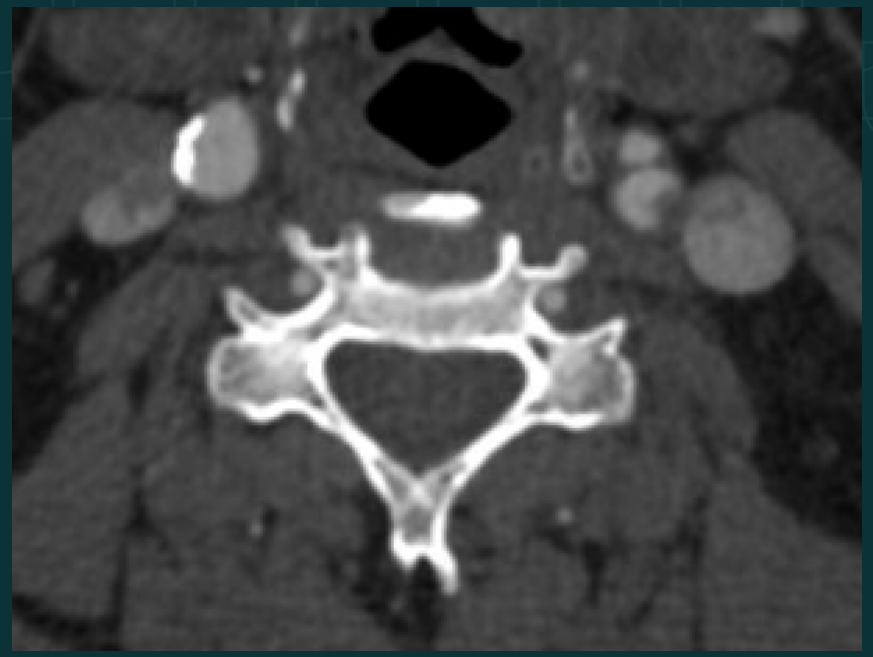
Fridman et al. *J of Internat Stroke. 2019*

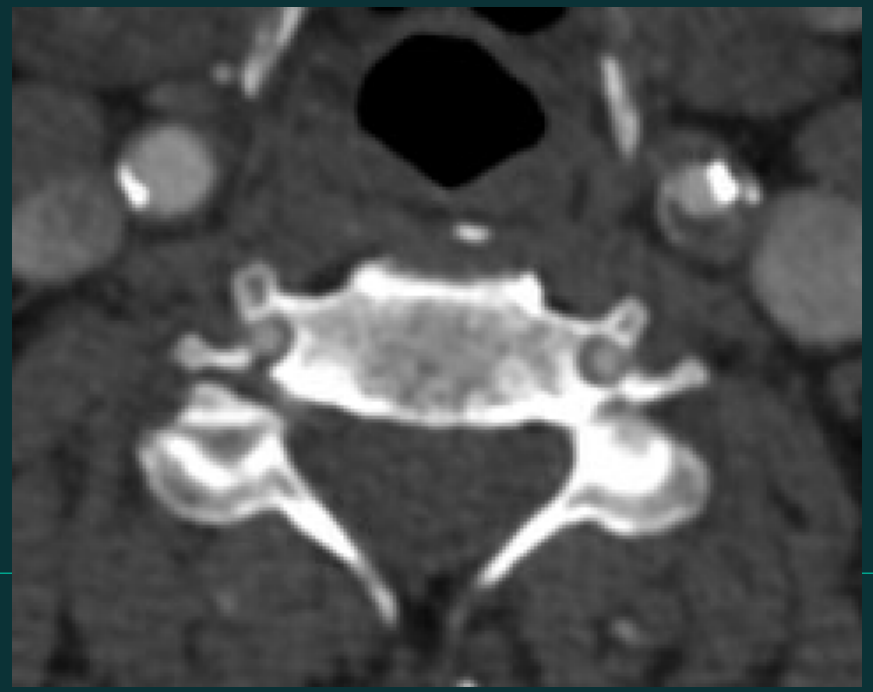
Case: MP

Started on heparin gtt for free-floating ILT

Repeat CTA 72 hours later showed residual moderate stenosis of L ICA







Case: MP

Taken for TCAR on day 16 post-stroke (somewhat delayed due to small asymptomatic hemorrhagic transformation)

Discharged on 3 month course of DAPT

3 month mRS 2

- ambulates independently
- mild aphasia limiting ability to work but able to carry out most other activities

Transitioned outpatient to Repatha

Conclusions

ILT is an uncommon finding in acute stroke that carries high risk of early stroke recurrence

There is clinical equipoise in management of ILT regarding:

- Hyperacute interventions – IV thrombolysis and mechanical thrombectomy
- Acute medical management with antiplatelets and/or anticoagulation
- Optimal timing of revascularization procedures

There is no clear evidence supporting anticoagulation over antiplatelet therapy for ILT

Very early revascularization for carotid ILT may be higher risk than delayed revascularization (>72 hours)

Further research is warranted to guide early management of ILT

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THANK YOU

Questions?