

Vertebral artery dissection

An artistic illustration of a woman with long dark hair, wearing a white short-sleeved shirt and a dark skirt, standing on a balcony with a black railing. She is reaching out with her right hand towards a white paper airplane flying in the sky. The sky is a vibrant blue with soft, white, fluffy clouds. Several other paper airplanes, in shades of orange and white, are scattered throughout the sky. Small white birds are also visible flying in the distance. The overall atmosphere is dreamy and hopeful.

F1 Nuengruethai



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Pathophysiology

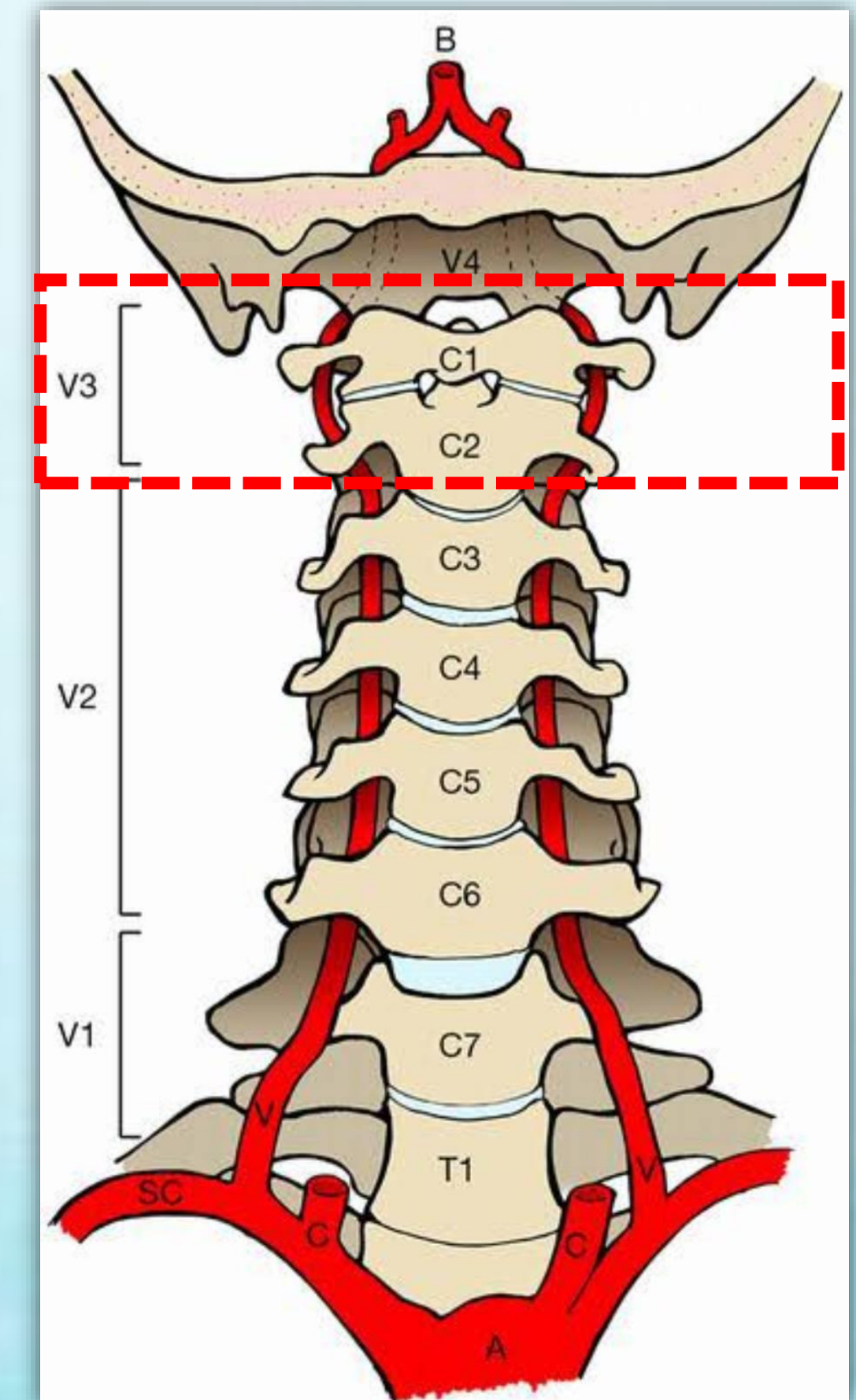
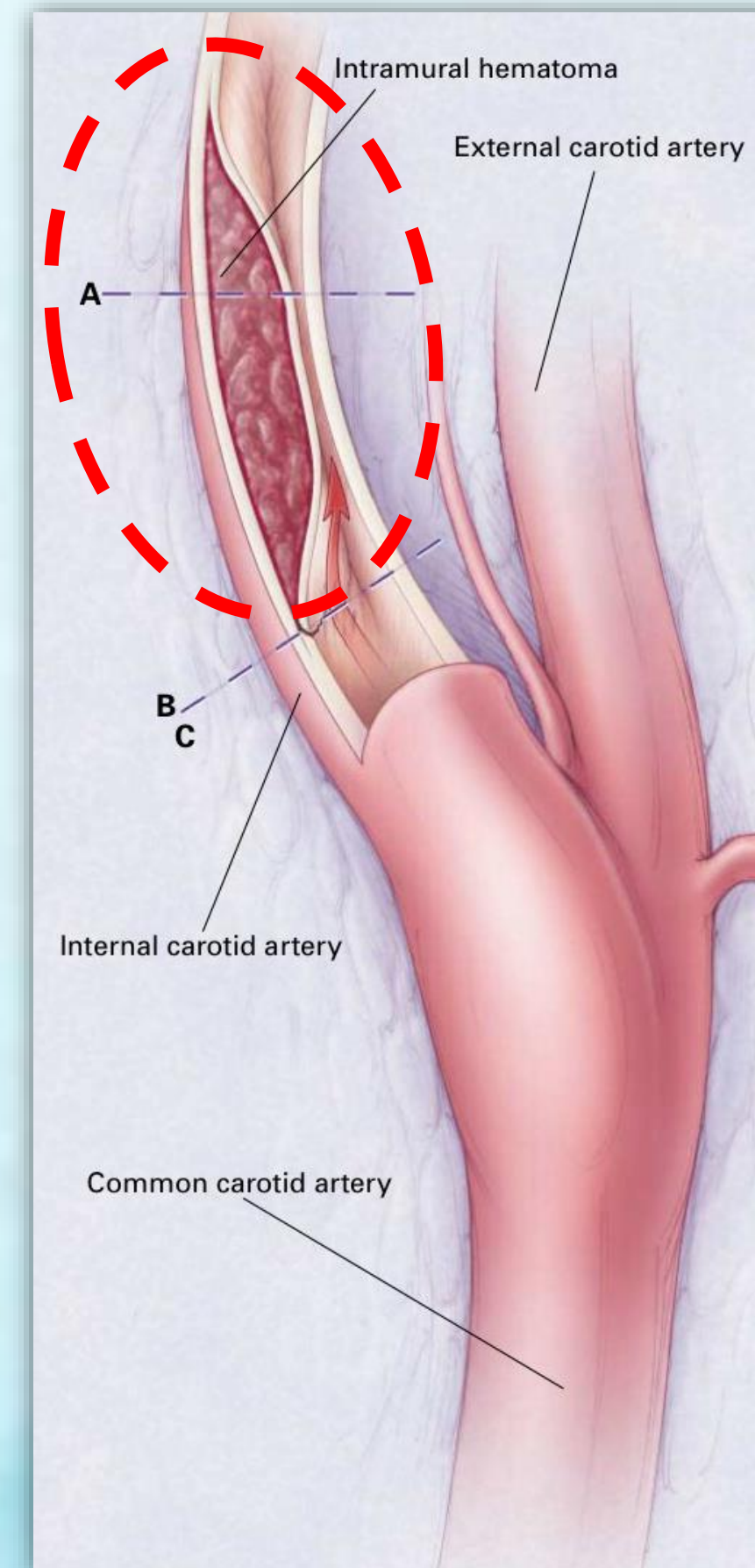
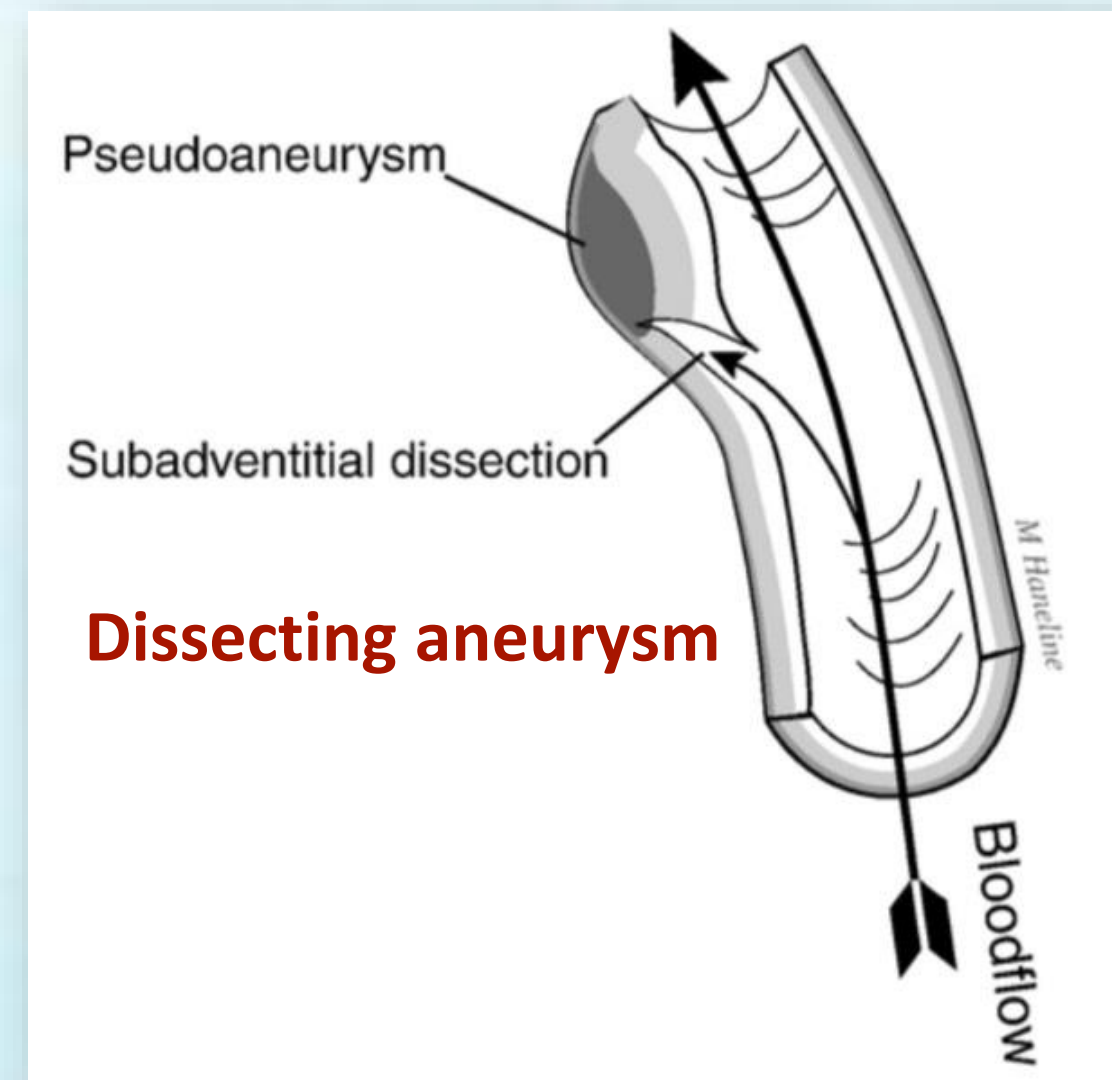
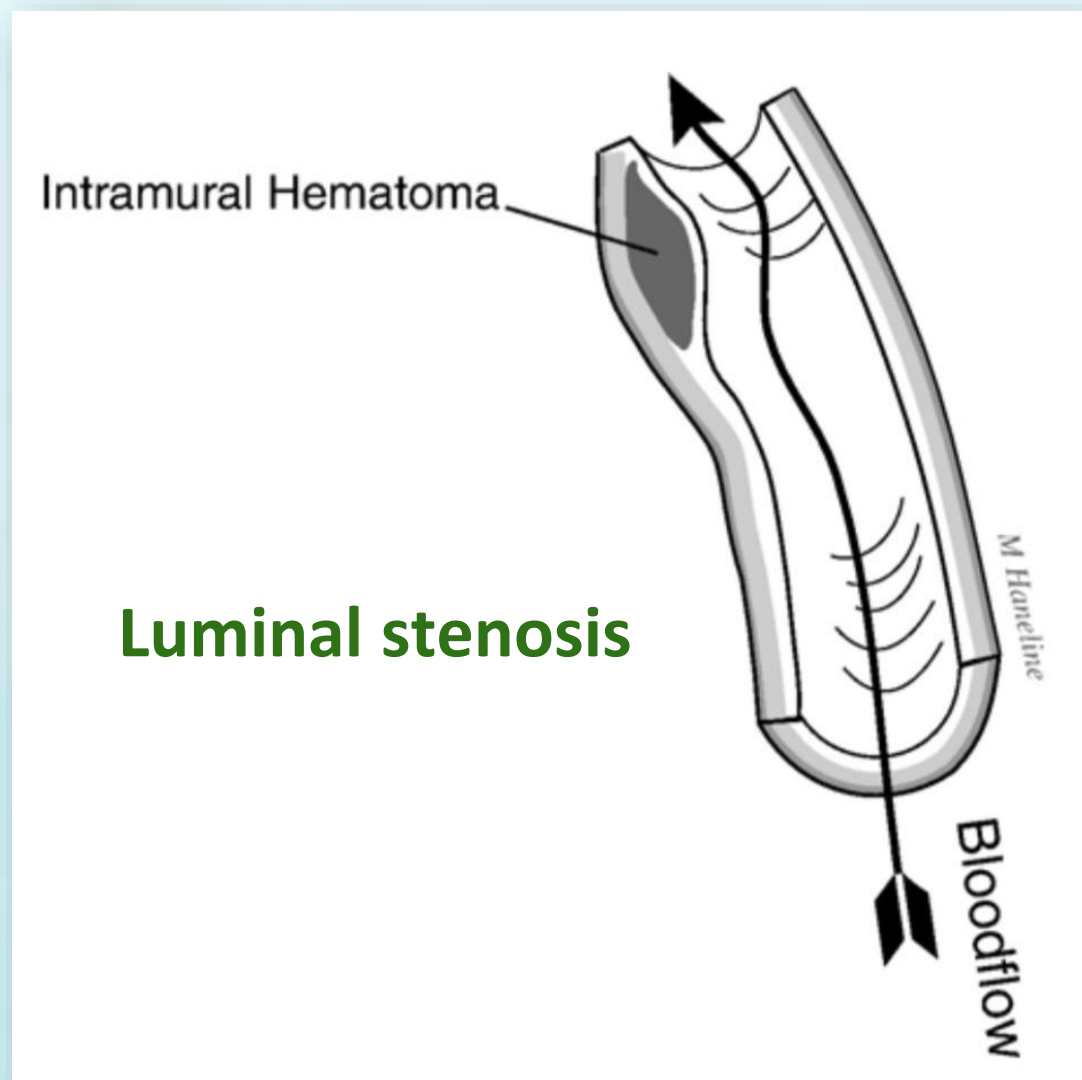
Common sites

Subintimal dissection

Subadventitial dissection

ICA: ≥ 2 cms
distal to carotid bifurcation

VA : V3 segment at C1-C2 level



Thromboembolism
(A to A emboli)
Hypoperfusion
(low flow)



Pain
Compression nerve
SAH

Etiology

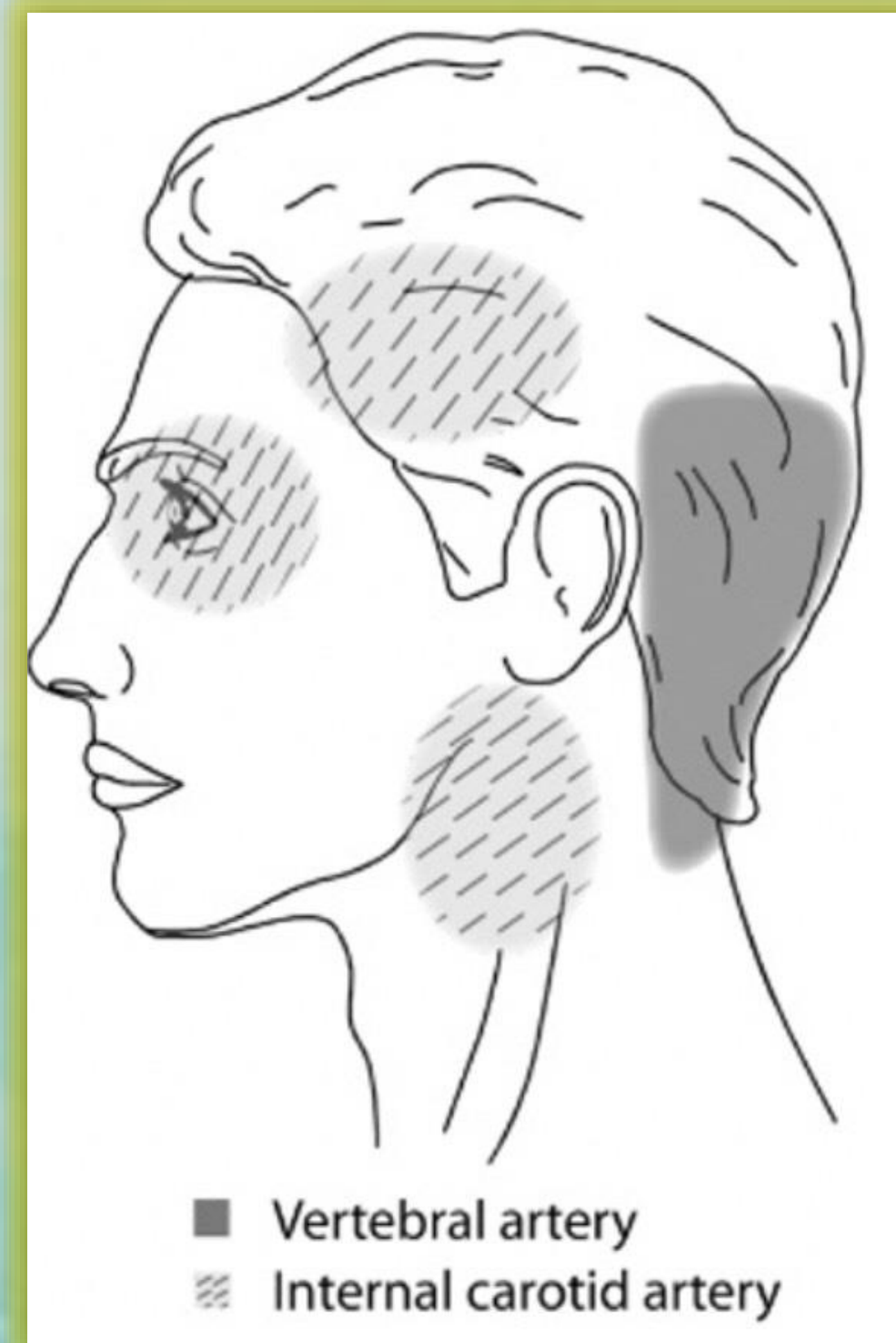
- Blunt trauma to neck
- Cervical cord injury or spine fracture (20-40%)
- Minor trauma
- Coughing/vomiting
- Chiropractic procedure
- Cervical spine manipulation (1 in 20,000)
- Ehlers-Danlos syndrome
- Spontaneous dissections

Risk factors

- Hypertension
- Fibromuscular dysplasia
- Female
- OCP
- Vasculitis
- Sports: Yoga, Judo, wrestling

Epidemiology

- 2% of all ischemic stroke
- More common causes of stroke in young (10-25%)
- 2.6 cases per 100,000
- Carotid artery dissections 3-5x **VS** VA dissections



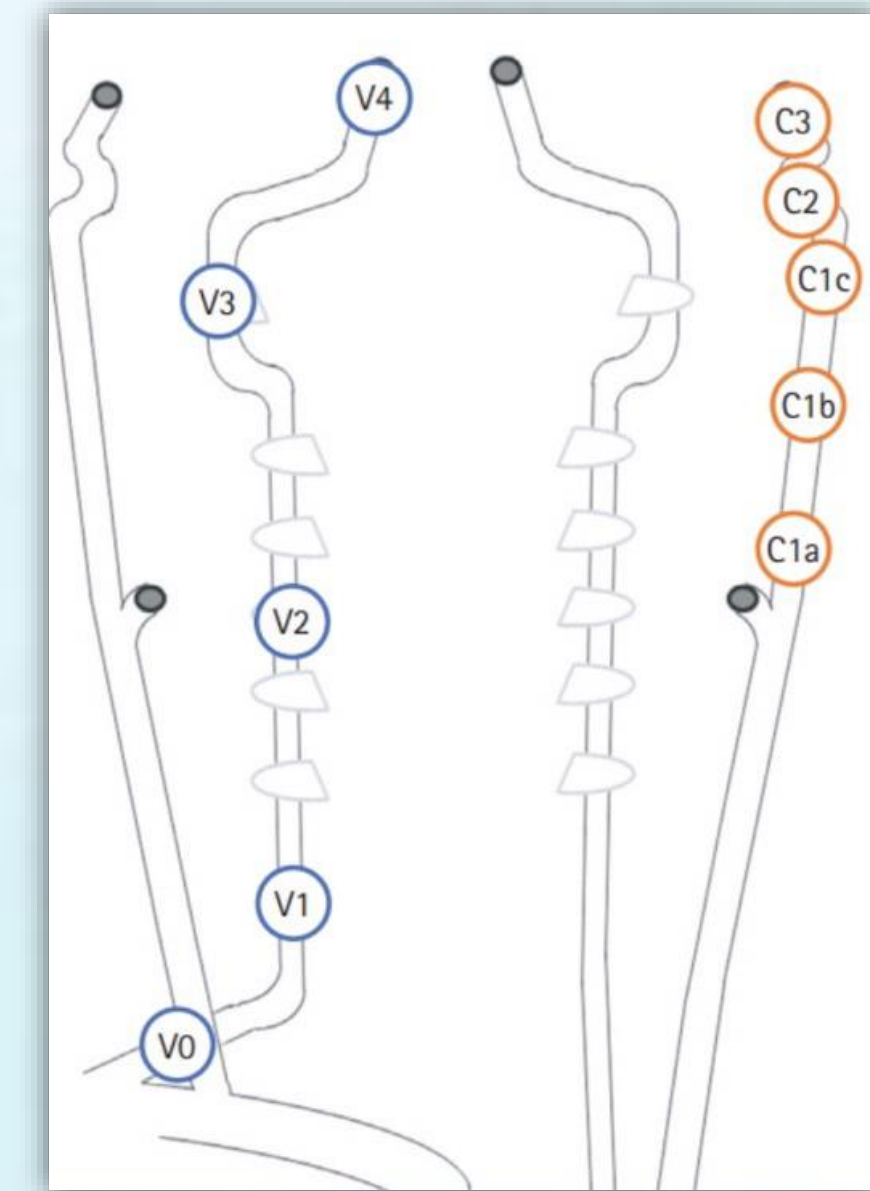
Presentation

- Headache (60-90%): CAD < 20% thunderclap headache
 - Neck pain: VAD
 - TIA/Ischemic stroke: 77% present at time diagnosis
- Neurological deficit by**
- **Occlusion**
 - **Emboli:**
 - Anterior circulation (CAD)
 - Posterior circulation (VAD)
 - **Compressive aneurysm:**
 - Horner syndrome
 - Pulsatile tinnitus
 - CN palsy

Presentation

Table 3. Presentation Of Spontaneous Cervical Artery Dissection

Symptoms	Location of Dissection	
	Carotid	Vertebral
Pain distribution	<ul style="list-style-type: none"> • Headache or migraine, 36%, 68%,⁶⁷ 65%^{5,68} • Occipital headache, 1%⁶⁷ • Frontal headache, 23%⁶⁸ • Facial or orbital pain, 52%⁶⁷ • Neck pain, 16%,⁵ 26%⁶⁷ • Chest pain* 	<ul style="list-style-type: none"> • Headache or migraine • Neck pain • Neck pain posteriorly • Chest pain*
Neurological deficits, by occlusion	<ul style="list-style-type: none"> • Hemiparesis and sensory loss • Monocular blindness • Hemineglect • Aphasia (if dominant hemisphere) 	<ul style="list-style-type: none"> • Locked-in syndrome • Respiratory failure • Hemianopsia or bilateral visual field loss
Neurological deficits, by emboli	Anterior circulation deficits: <ul style="list-style-type: none"> • Amaurosis fugax (monocular blindness), 17%⁵ • Hemineglect • Hemiparesis, 23%⁵ • Aphasia • Dysarthria • Hemisensory loss, 7%⁵ 	Posterior circulation deficits: <ul style="list-style-type: none"> • Hemianopsia or unilateral field deficit • Ataxia, 20%⁴⁰ • Diplopia • Dysarthria • Upside-down vision • Lateral medullary syndrome (Wallenberg syndrome), 32%⁴⁰: dysphagia, hemiparesis, diplopia, facial weakness, unilateral tinnitus
Neurological deficits by compressive aneurysmal dilatation and disruption of adventitia	<ul style="list-style-type: none"> • Horner syndrome, unilateral miosis, ptosis, anhidrosis, 35%, 20%-48%⁶⁸ • Dysgeusia, 0.5%⁶⁸ • Pulsatile tinnitus, 16%⁶⁸ • Ocular motor palsy: CN III, IV, VI, 2.6%¹¹⁷ • Palsy of CN V, 3.7%¹¹⁶ • Palsy of CN VII, IX-XII, 7.5%,⁷⁴ 12%¹¹⁶ 	<ul style="list-style-type: none"> • Pulsatile tinnitus, 5% • Unilateral radicular weakness (C5-C6 most common), 1%^{123,125,127,128}



Vertebral artery	% V0-V4 (n=141)
Headache	84.4 (119)
Horner's	0.0
Cranial nerve palsy	0.0
Tinnitus	3.5 (5)

Internal carotid artery	% C1a-C3 (n=127)
Headache	74.8 (95)
Horner's	33.1 (42)
Cranial nerve palsy	10.2 (13)
Tinnitus	13.4 (17)

Diagnosis

Neuroimaging

- **CTA & MRA:**
equal Se/Sp
- **Digital subtraction angiography (DSA)**
(Gold standard)
- **TCCD/CDUS :**
Se/Sp
68-95/20%

CTA



Flame-shape occlusion



Pseudoaneurysm

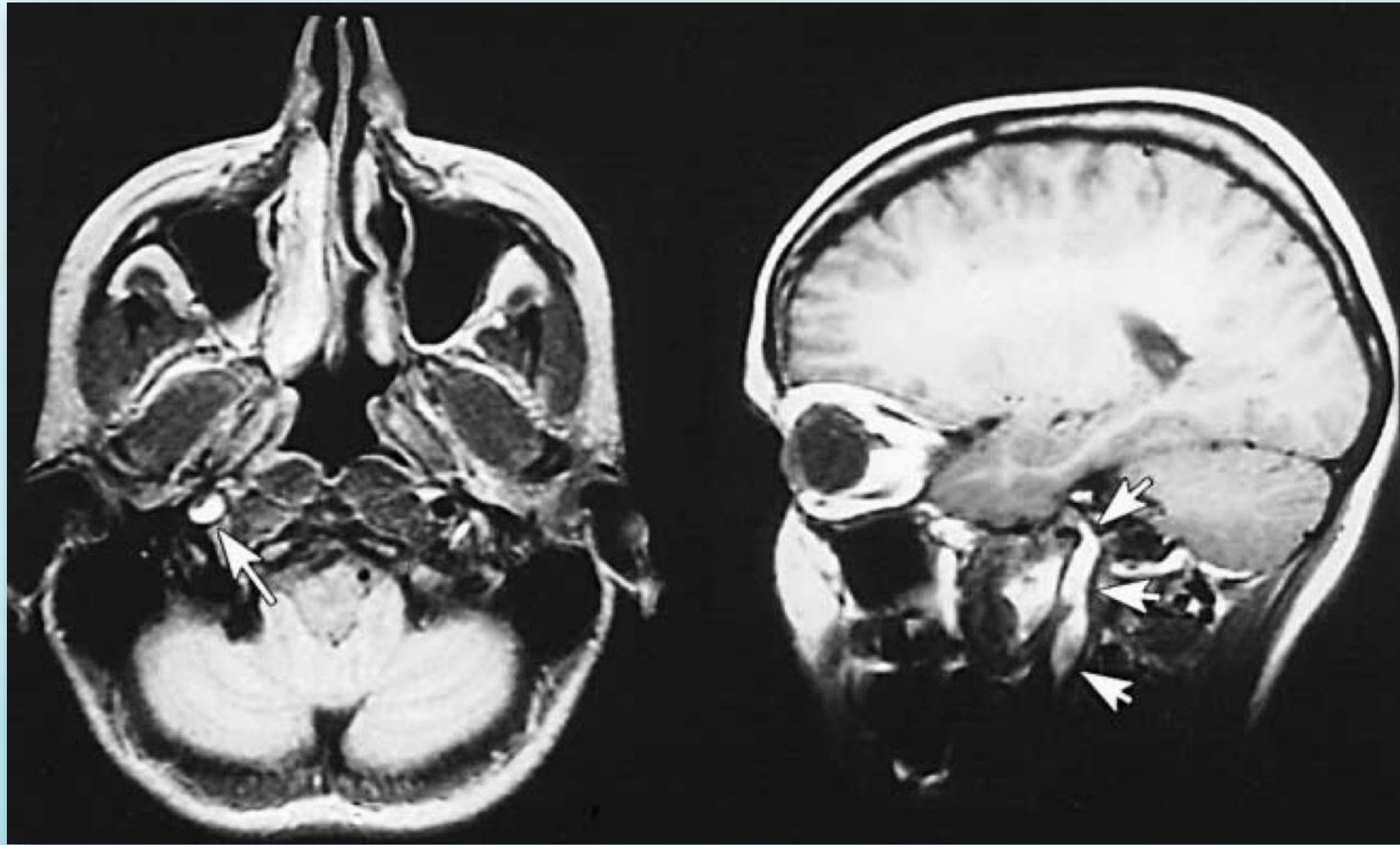


Intimal flap

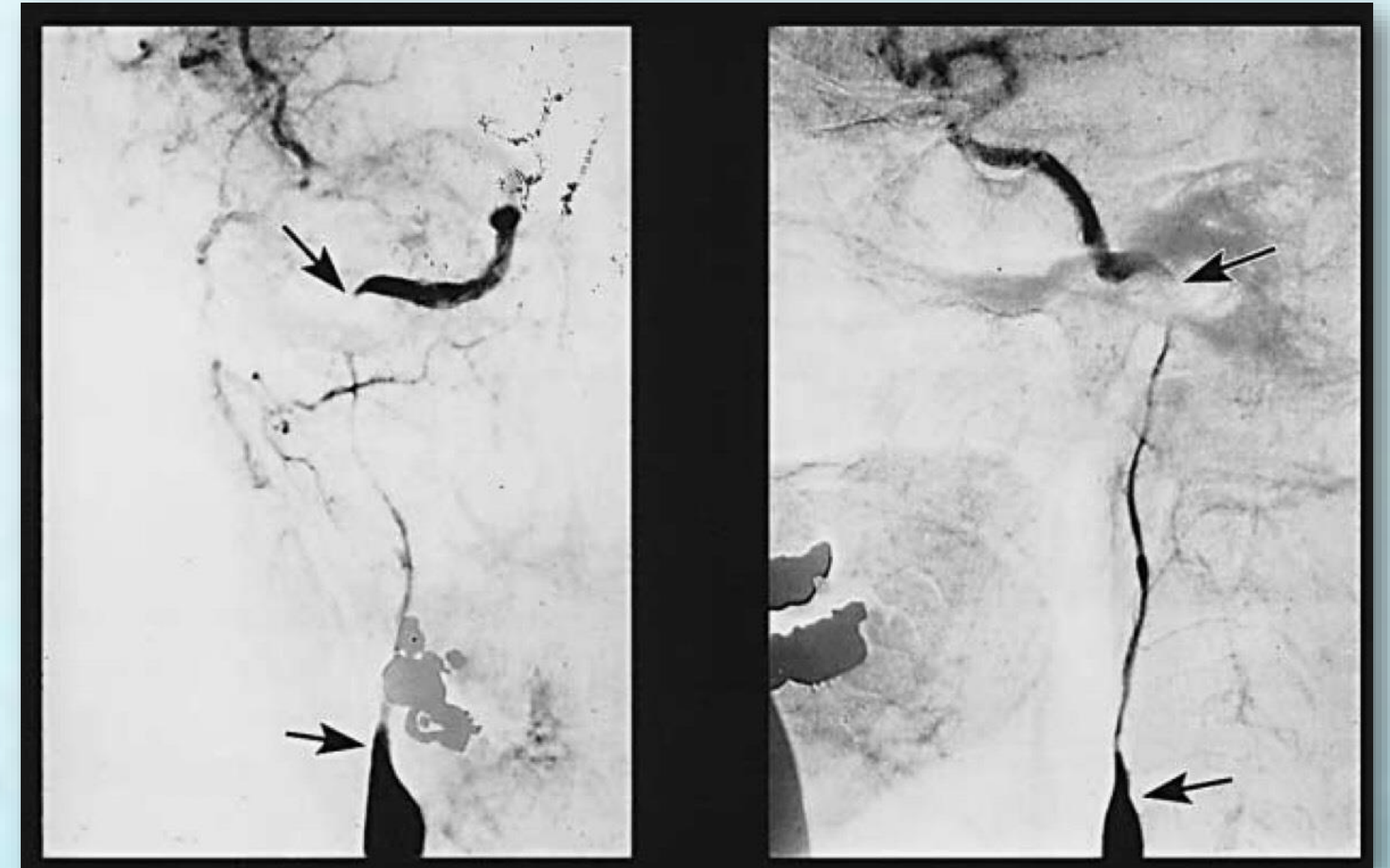
Angiographic finding (Se/Sp 64-100%/51-98%)

Diagnosis

MRA (Se/Sp 95-100%/50-79%)



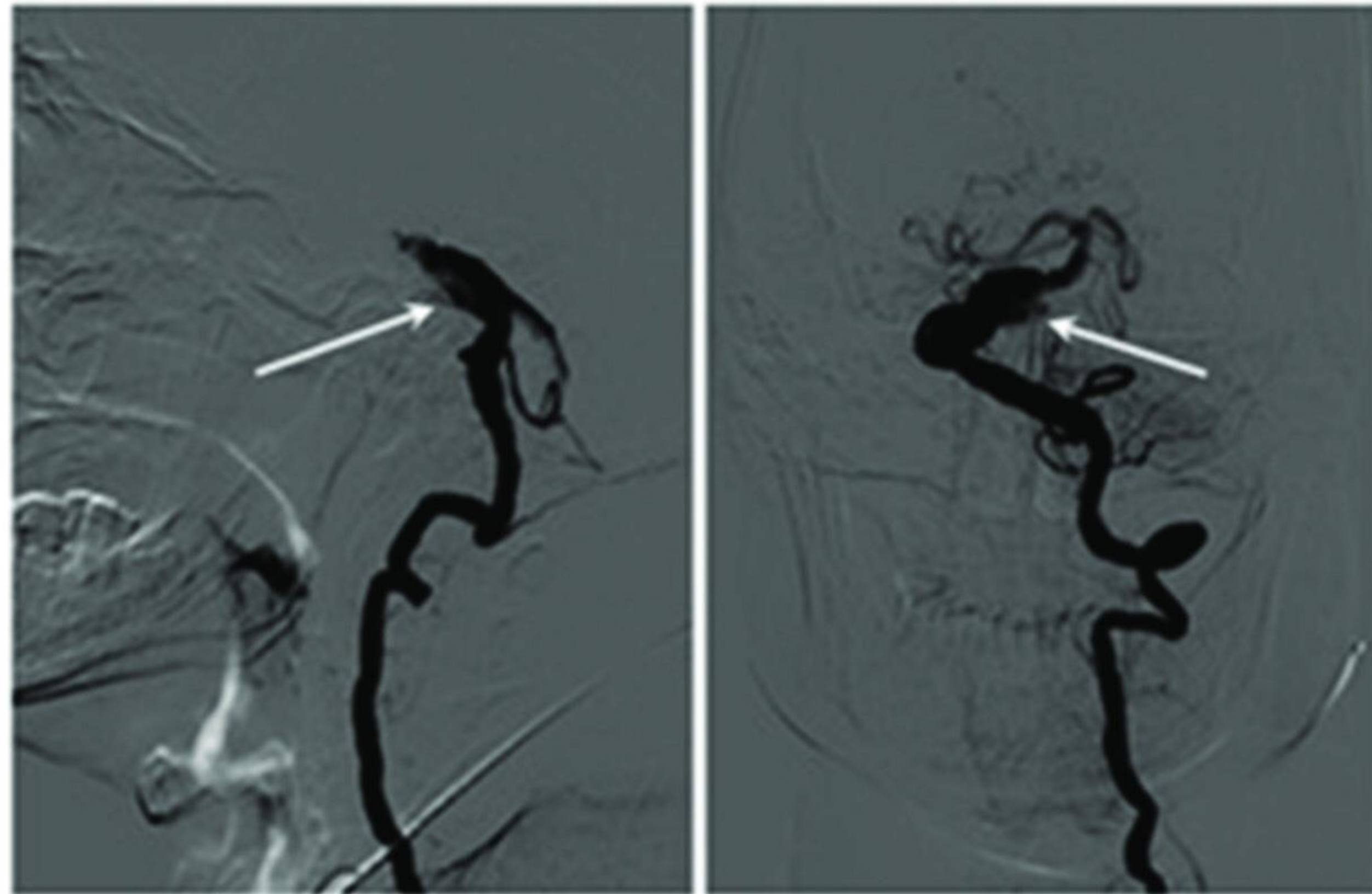
Intramural hematoma Rt ICA



Flame-shape occlusion

Diagnosis

Digital subtraction angiography (DSA): Gold standard



| Digital subtraction angiography (DSA) examination identified a basilar artery dissection indicating the delayed image of distal basilar artery and the stratification and retention of contrast agent (arrow).

Treatment

AHA/ASA Guideline

Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Acute treatment



Extracranial cervical dissections	IV alteplase in AIS known or suspected to be associated with extracranial cervical arterial dissection is reasonably safe within 4.5 h and probably recommended.† (COR IIa; LOE C-LD)§
Intracranial arterial dissection	IV alteplase usefulness and hemorrhagic risk in AIS known or suspected to be associated with intracranial arterial dissection remain unknown, uncertain and not well established.† (COR IIb; LOE C-LD)§
Aortic arch dissection	IV alteplase in AIS known or suspected to be associated with aortic arch dissection is potentially harmful and should not be administered.† (COR III: Harm; LOE C-EO)§ (Recommendation wording modified to match COR III stratifications.)

Treatment

AHA/ASA Guideline

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 A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Antiplatelet treatment compared with anticoagulation treatment for cervical artery dissection (CADISS): a randomised trial

The CADISS trial investigators*

Secondary prevention

6.6.3. Arterial Dissection

1. For patients with AIS and extracranial carotid or vertebral arterial dissection, treatment with either antiplatelet or anticoagulant therapy for 3 to 6 months is reasonable.

COR

LOE

Ila

B-NR

2. For patients with AIS and extracranial carotid or extracranial vertebral arterial dissection who have definite recurrent cerebral ischemic events despite medical therapy, the value of extracranial EVT (stenting) is not well established.

Iib

C-LD

	Intention-to-treat population				Per-protocol population			
	Antiplatelet group (n=126)	Anticoagulant group (n=124)	OR (95% CI)*	p value	Antiplatelet group (n=101)	Anticoagulant group (n=96)	OR (95% CI)*	p value
Ipsilateral stroke or death	3 (2%)	1 (1%)	0.335 (0.006-4.233)	0.63	3 (3%)	1 (1%)	0.346 (0.006-4.390)	0.66
Secondary endpoints								
Any stroke or death	3 (2%)	1 (1%)	0.335 (0.006-4.233)	0.63	3 (3%)	1 (1%)	0.346 (0.006-4.390)	0.66
Any stroke, death, or major bleed	3 (3%)	2 (2%)	0.673 (0.055-5.983)	1.00	3 (3%)	2 (2%)	0.696 (0.057-6.220)	1.00
Any stroke	3 (2%)	1 (1%)	0.335 (0.006-4.233)	0.63	3 (3%)	1 (1%)	0.346 (0.006-4.390)	0.66
Ipsilateral stroke, TIA, or death	4 (3%)	5 (4%)	1.280 (0.268-6.614)	0.98	4 (4%)	4 (4%)	1.054 (0.190-5.835)	1.00
Any stroke or TIA	5 (4%)	5 (4%)	1.017 (0.228-4.540)	1.00	5 (5%)	4 (4%)	0.836 (0.161-4.015)	1.00
Major bleeding	0 (0%)	1 (1%)	..	..	0 (0%)	1 (1%)	..	..
Death	0 (0%)	0 (0%)	..	..	0 (0%)	0 (0%)	..	..

Data for presence of residual stenosis (>50%) at 3 months have not yet been analysed. OR=odds ratio. TIA=transient ischaemic attack. *Tested with exact logistic regression.

Table 2: Outcomes within 3 months

Patient	250 Pts (Extracranial carotid (118) and VAD (132) with Onset of symptoms within past 7 days (39 centers in UK)
Intervention	Antiplatelet (126)
Control	Anticoagulant (124)
Outcome	No difference efficacy to prevent stroke & death But low stroke rate and events



AMERICAN
COLLEGE of
CARDIOLOGY
FOUNDATION



ACCF/AHA Pocket Guideline

Based on the 2011
ASA/ACCF/AHA/AANN/AANS/ACR/
CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS

Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease

*Developed in Collaboration With the
American Academy of Neurology and Society
of Cardiovascular Computed Tomography*

January 2011

18. Management of Patients With Cervical Artery Dissection

Class I 1. Contrast-enhanced CTA, MRA and catheter-based angiography are useful for diagnosis of cervical artery dissection. (Level of Evidence: C)

Class IIa 1. Antithrombotic treatment with either an anticoagulant (heparin, low molecular weight heparin or warfarin*) or a platelet inhibitor (aspirin, clopidogrel or the combination of extended-release dipyridamole plus aspirin*) for at least 3 to 6 months is reasonable for patients with extracranial carotid or vertebral arterial dissection associated with ischemic stroke or TIA. (Level of Evidence B)

* Drugs are not listed in order of preference.

Class IIb 1. CAS might be considered when ischemic neurological symptoms have not responded to antithrombotic therapy after acute carotid dissection. (Level of Evidence: C)

2. The safety and effectiveness of therapy with a-adrenergic antagonist, angiotensin inhibitor, or nondihydropyridine calcium channel antagonist to lower BP to normal and reduce arterial wall stress are not well established. (Level of Evidence: C)

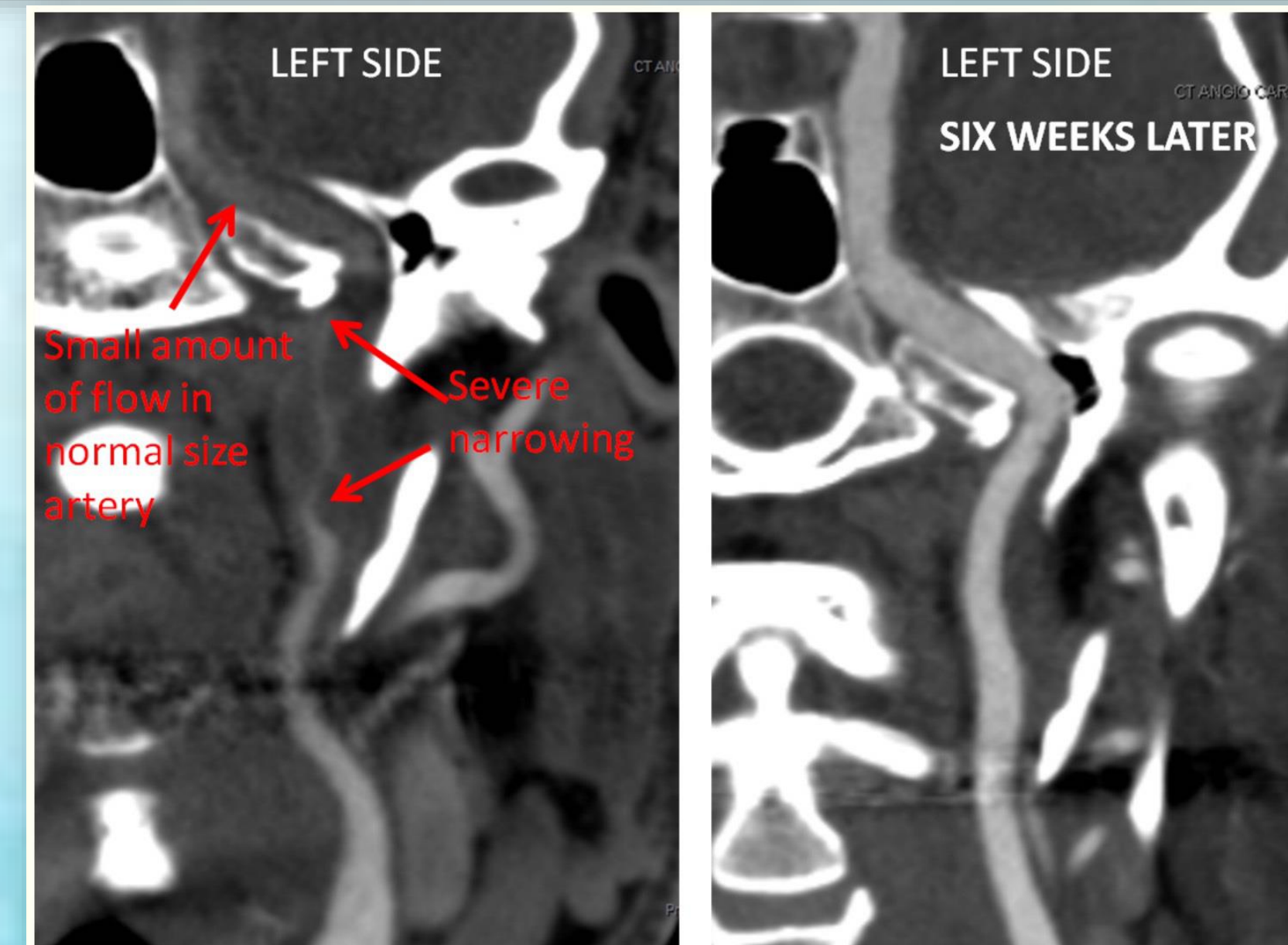
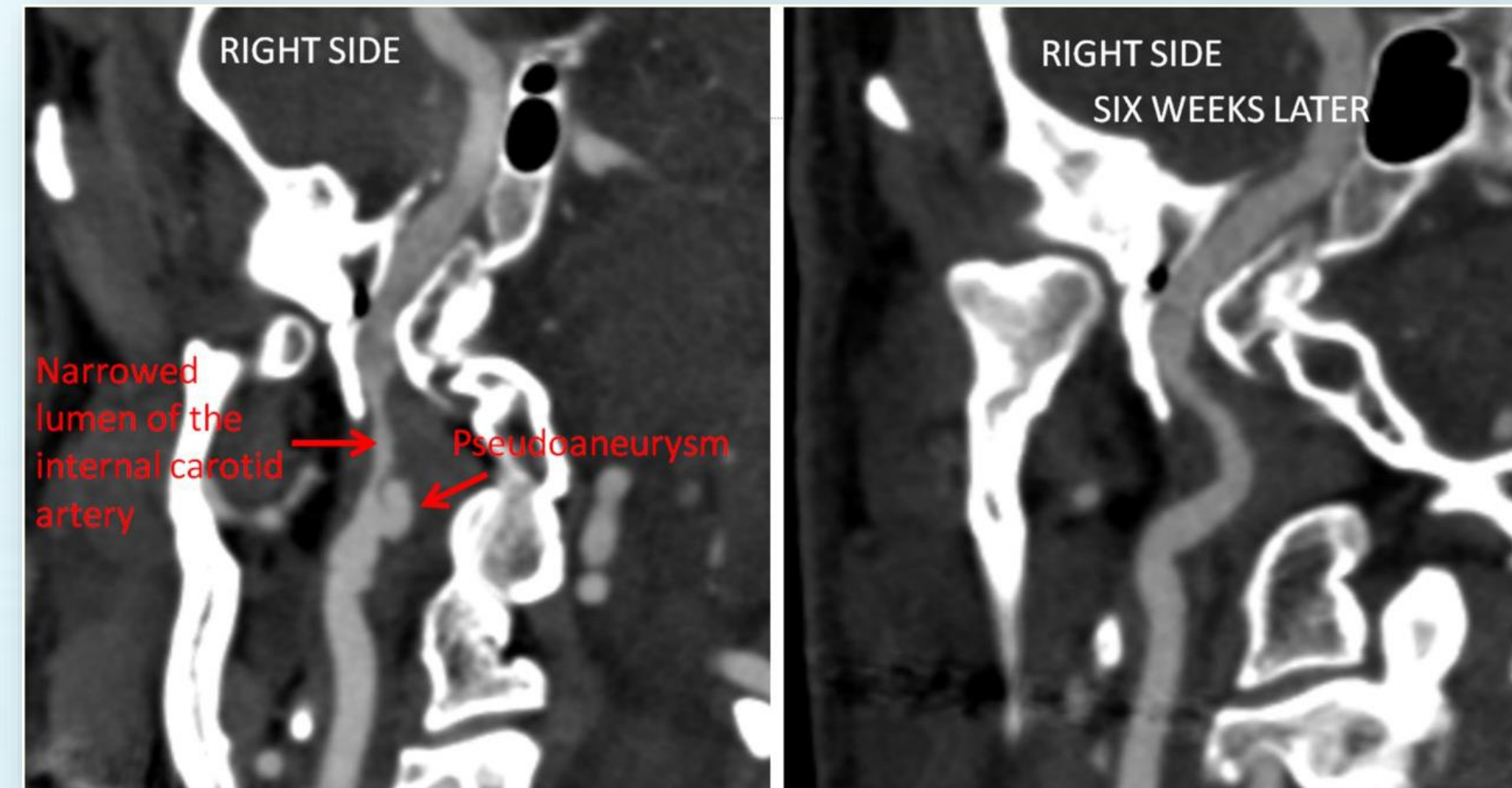
Prognosis

Vessel healing

60-70 %
Complete recanalization of
vertebral artery 6-9 mo

Recurrence

- 0.3-1% annually
- 2% at 3 mo
- Asians higher recurrent rate
- Not related aneurysm formation



Take Home Message

- **Common sites: ICA \geq 2 cms distal to carotid bifurcation, VA at V3 segment (C1-2)**
- **More common cause of stroke in the young 10-25%, CAD (3-5x) > VA**
- **Presentation: Headache more common, neck pain, TIA and AIS (occlusion, emboli, compressive aneurysm)**
- **CTA, MRA equal Se/Sp, DAS is gold standard (but rare to used)**
- **Extracranial cervical dissection rtPA in 4.5 hrs AIS is safe but unknown usefulness and hemorrhagic risk in AIS with intracranial arterial dissection and harm in aortic arch dissection**
- **AIS with extracranial carotid or VA dissection treatment with antiplatelet or anticoagulant for 3-6 mo**



Thank you