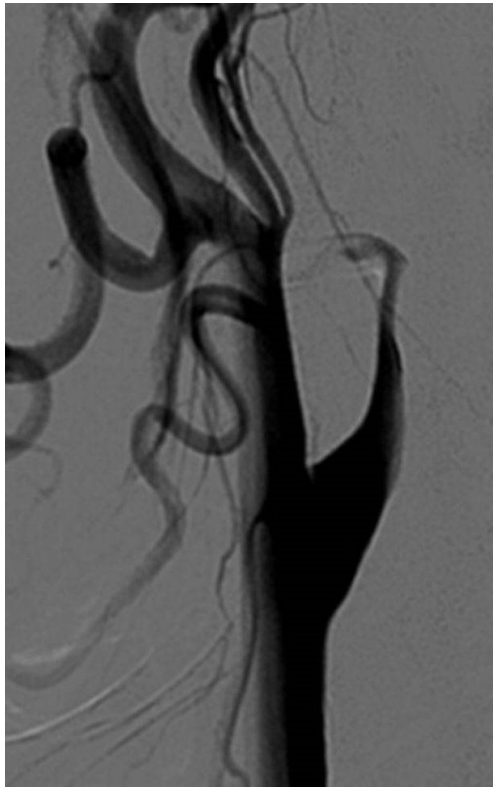
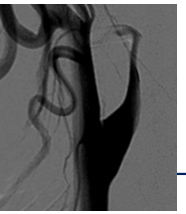
Ateliers d'imagerie du CNCF
Avignon – Mars 2023



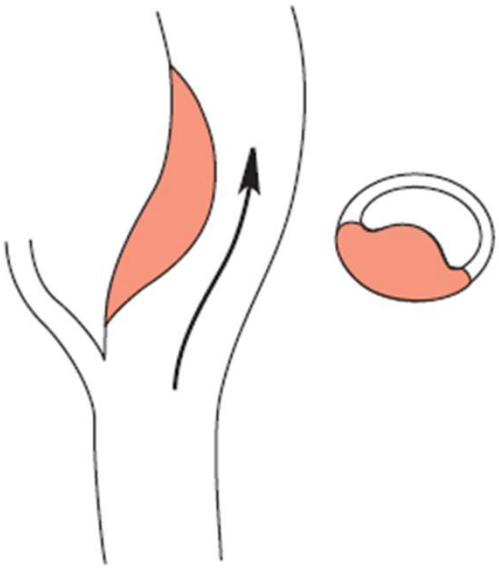
Prise en charge des dissections carotides et vertébrales

Pr Laurent SUISSA

Unité NeuroVasculaire
Hôpital Timone adulte
Marseille
Laurent.suissa@ap-hm.fr

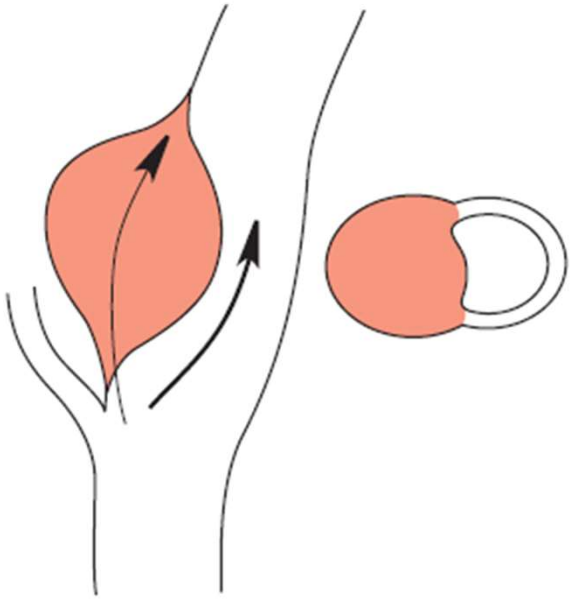


Dissection artérielle définit par un hématome de paroi



Dissection sous-intimale (Intima/media)

➔ Sténose artérielle

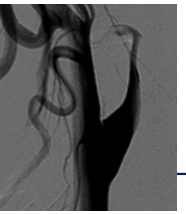


Dissection sous-adventitielle (Media/adventice)

➔ Pseudo anévrisme disséquant

<u>Dissection carotide interne:</u>

- Plus fréquente (4 fois plus que les vertébrales)
- 90% des dissections sont extra-crâniennes
- Dissections multiples (10-20%)

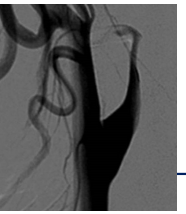


Physiopathologie des dissections artérielles

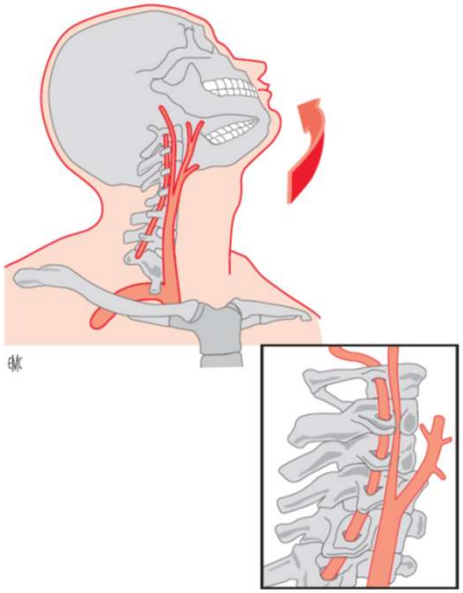
facteur déclenchant

+

Vulnérabilité vasculaire



Physiopathologie des dissections artérielles



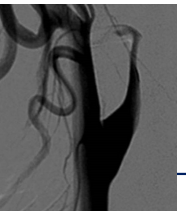
➔ Traumatique (2%)

Traumatismes majeurs
Accident de la voie publique
Strangulation, coup direct sur la carotide, ponction carotidienne, manipulations cervicales
Sports avec traumatismes ou mouvements violents du cou (chutes de ski ou de vélo, arts martiaux, plongeon, rugby…)

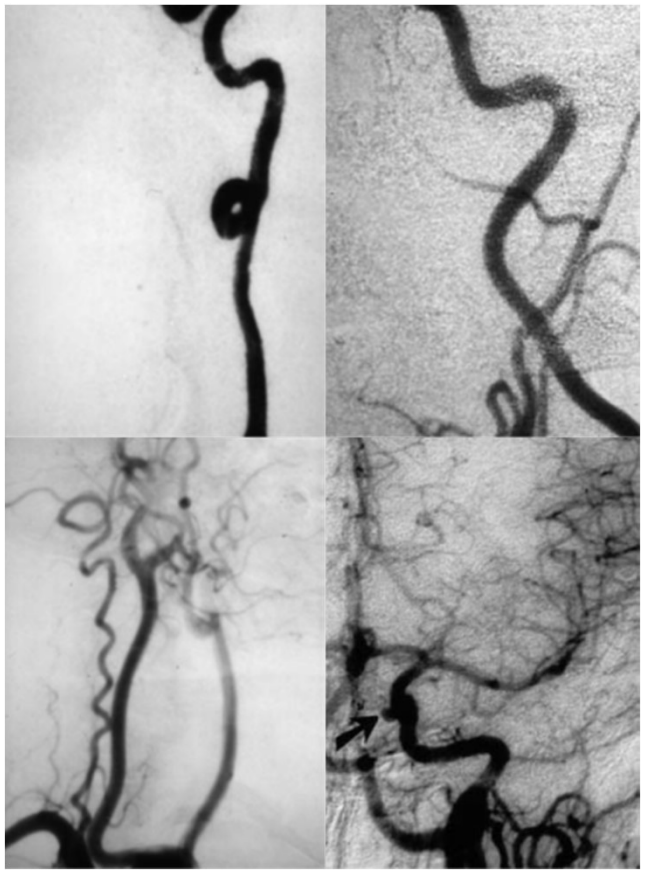
➔ Spontanée: Dissection sous l'impact d'un traumatisme mineur, infection

Traumatismes mineurs
Éternuements, efforts de toux ou de vomissement
Rasage, brossage des dents
Activité sexuelle
Montagnes russes et autres attractions foraines avec accélération, décélération brutale
Port de charge lourde sur une épaule, repeindre un plafond, communication téléphonique prolongée avec immobilisation du combiné contre la clavicule, effectuer un créneau en voiture, « cul-sec » itératifs…
Sports sans traumatisme ni mouvement violent : volley-ball, football, roller, jogging, cyclisme, yoga, ski, tennis…
Actes médicaux tels que intubation, bronchoscopie, cathétérisme jugulaire…
Accouchement

Dittrich *et al. Neurology.* 2007.



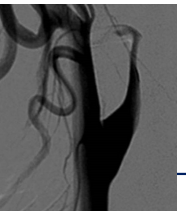
Dissection spontanée: artériopathie sous-jacente



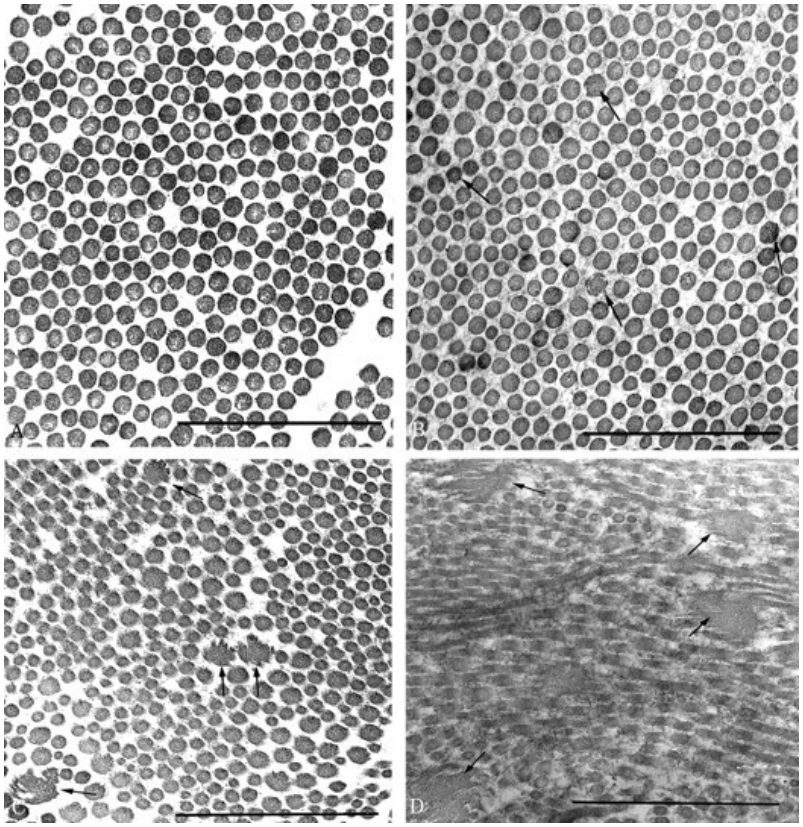
➔ **Stigmates d'artériopathies:**

- Redondances artérielles **(x3)**
- Anévrismes IC **(x5)**
- **Dysplasie fibro-musculaire (DFM) (x20)**
- Dilatation du segment initial de l'aorte (Ø>34 cm)
- Altération des propriétés biomécaniques de la paroi

- Maladie héréditaire du tissu conjonctif **(2%)**
  - Marfan (FBN),
  - Ehlers-Danlos (COL3),
  - Pseudoxanthome élastique (ELN)
  - Osteogénèse imparfaite (COL1)

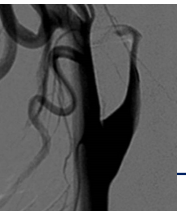


Dissection spontanée: artériopathie sous-jacente

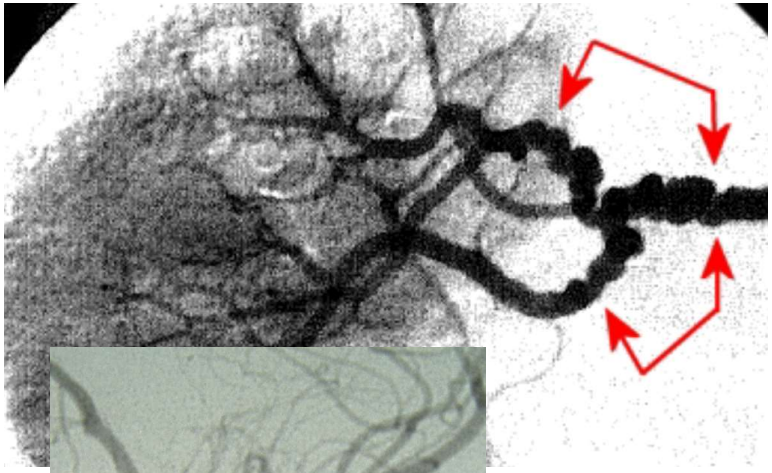


➔ **<u>Fragilité de la paroi de l'artère:</u>**

- Anomalie diffuse de la matrice extra-cellulaire
- Constituants fibrillaires rarement directement impliqués



Dissection spontanée et DFM (≈20%)



Artériopathie chronique non athéromateuse, non-inflammatoire

- A. rénales (60%, HTA++), a. cervicales (30%), a. digestives (10%)
- Multiple (30%), unique (70%)

Anatomopathologie

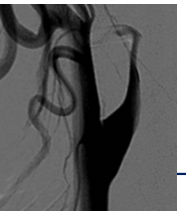
- Remplacement des cellules musculaires lisses par de la fibrose
- Sténoses artérielles multifocales
- Cause ? Formes familiales 11% des cas

Epidémiologie : Femme, 50 ans

Tableau cérébro-vasculaire

- Dissections cervico-encéphaliques (20% dissections ?), multiples
- Anévrysmes intracrâniens, Fistules artérioveineuses

➔ Recours à la médecine vasculaire (clinique, radiologie)



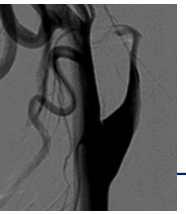
Dissection spontanée et artériopathies génétiques (≈2%)

➔ Recours à la médecine vasculaire (clinique, radiologie, génétique)

Marfan

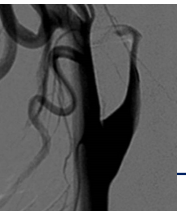
Ehlers-Danlos

Pseudo-xanthome élastique

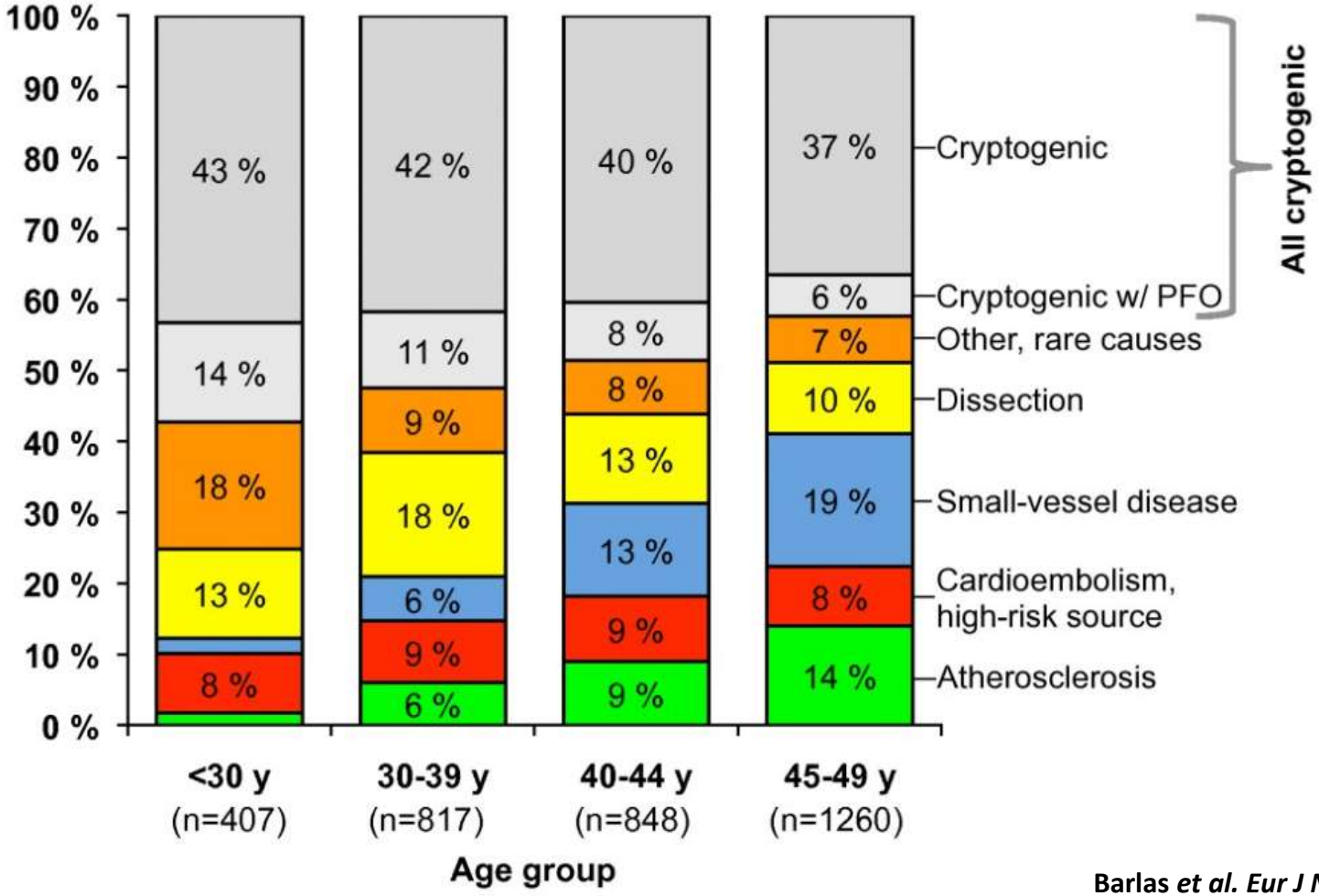


Epidémiologie

- **Données issues des registres**
- **Incidence annuelle: 2,5-3/100.000 habitants**
- **Age moyen: 40-45 ans**
- **Sexe ratio 1:1**
- **≈ 2% des infarctus cérébraux**

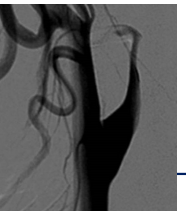


1ère cause connue d'infarctus cérébral du sujet jeune

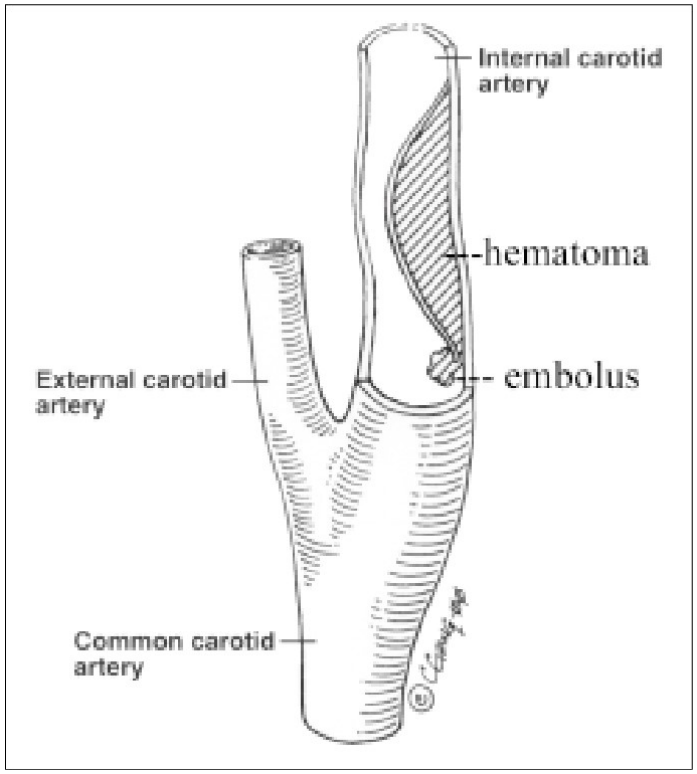


15 à 20% des infarctus cérébraux du sujet jeune

Barlas *et al. Eur J Neurol.* 2013.



La complication ischémique détermine le pronostic

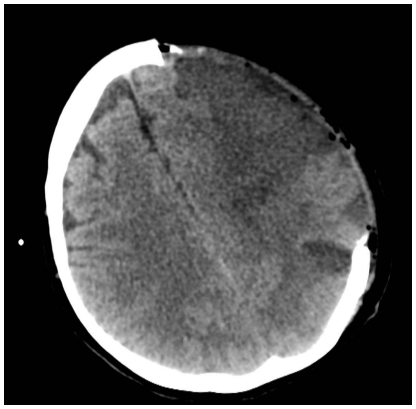


➔ **<u>AIT (30%):</u>**

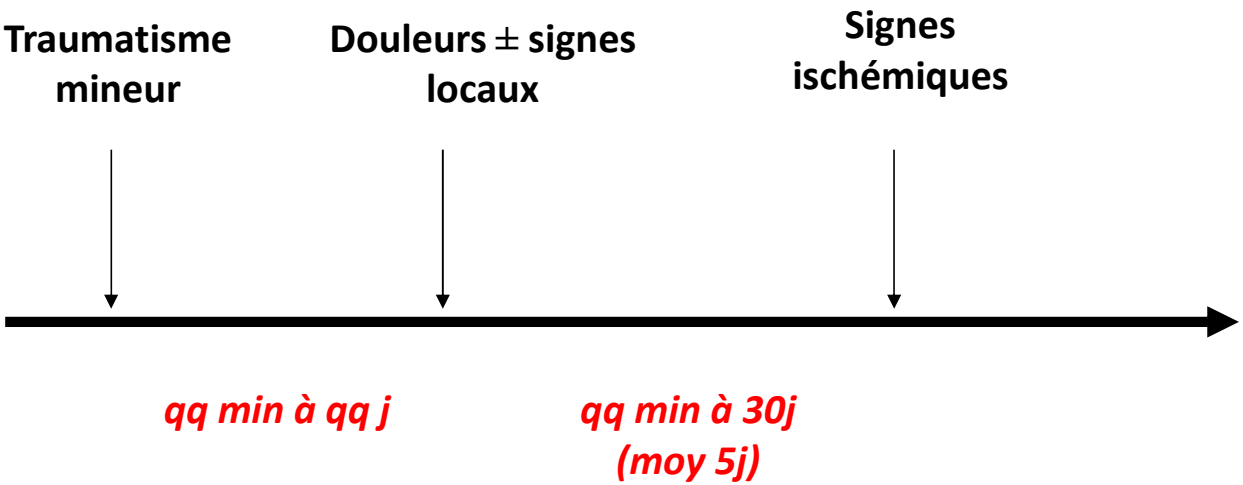
- Rétinien
- **Mécanisme hémodynamique**

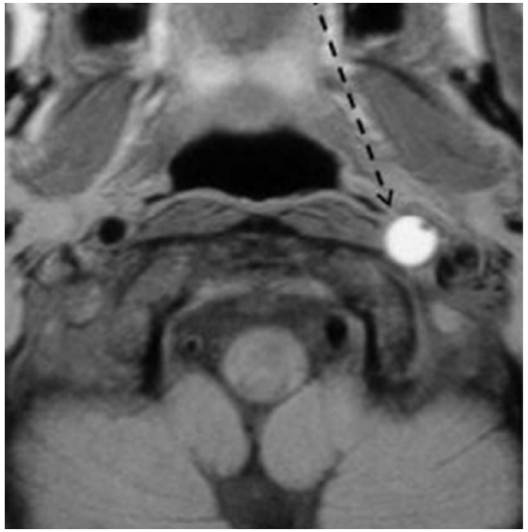
➔ **<u>Infarctus cerebral (45%):</u>**

- ACM +++ / Vertébrobasilaire
- **Mécanisme thromboembolique +++**
- Possibilité de traitements de phase aiguë (rt-PA IV; TM)



Evolution temporelle des symptômes





➔ 80% des manifestations ischémiques précédées par des signes d'alerte *(Biousse, 1995)*

Signes locaux

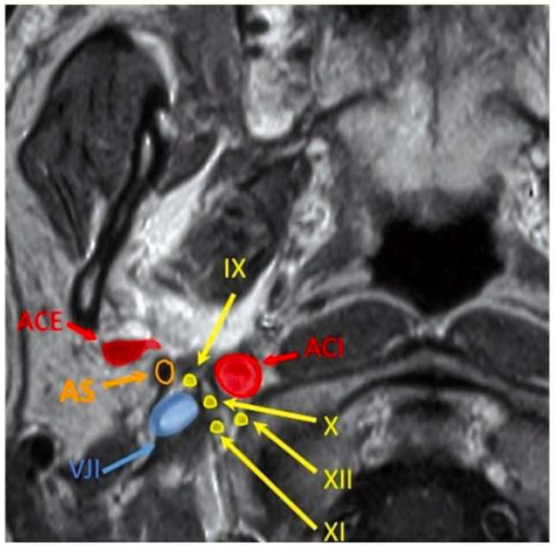
➔ **Douleur (90%)**
(Céphalée, algie faciale, cervicalgie)

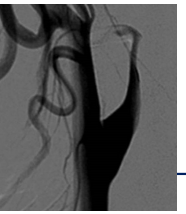
➔ **Signe de Claude Bernard-Horner (45%)**

➔ **Acouphènes pulsatiles (15%)**

➔ **Atteinte des nerfs crâniens (10%)**

Dissection carotidienne jusqu'à preuve du contraire

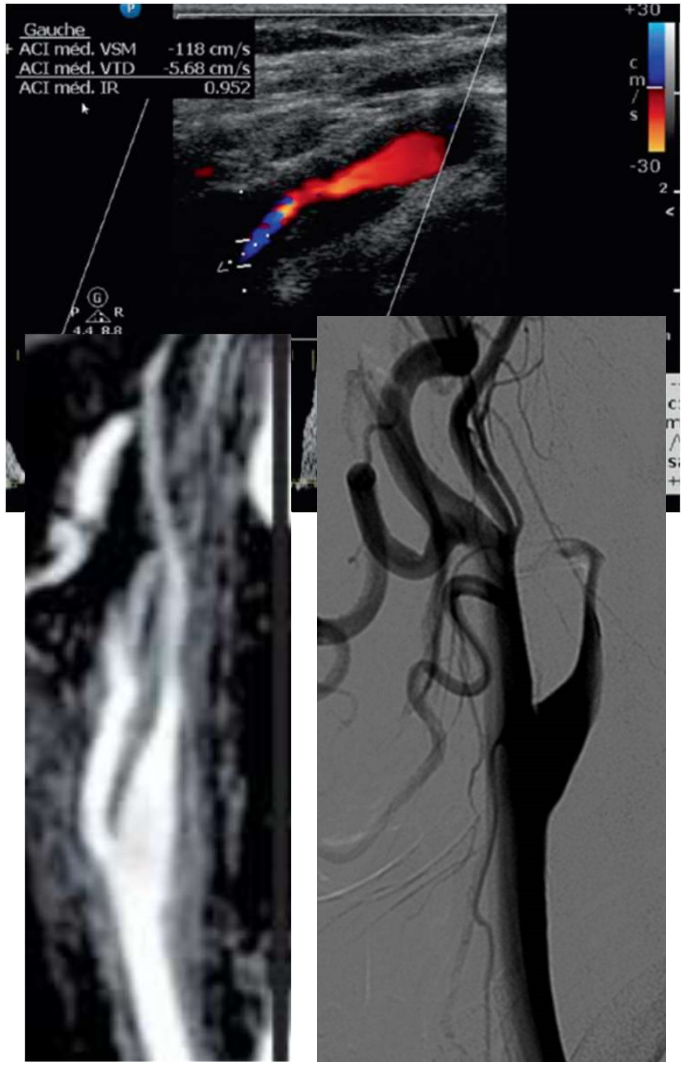




Diagnostic radiologique

➔ **Signes indirects**

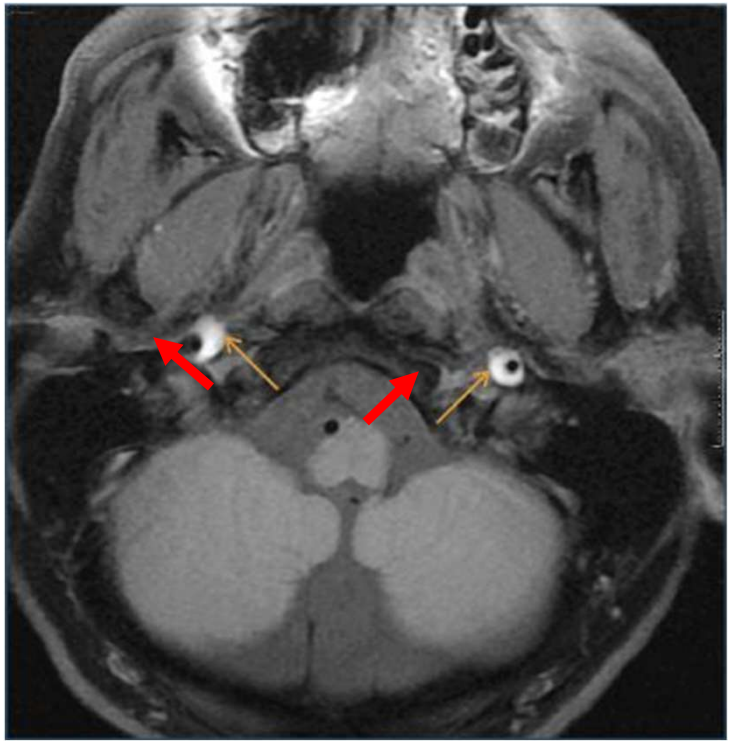
Occlusion (35%) Sténose (48%) Anévrisme disséquant (17%)



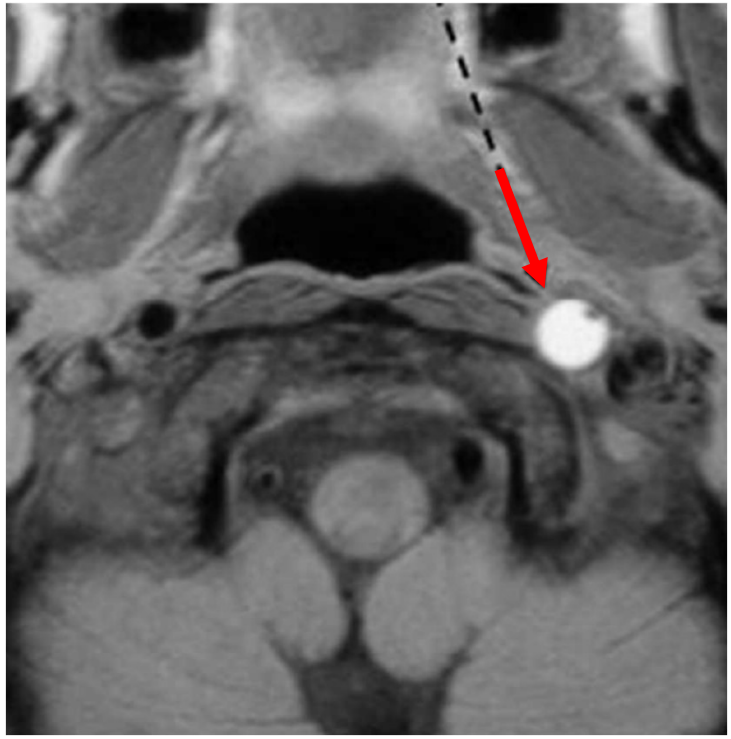
IRM: Examen de certitude

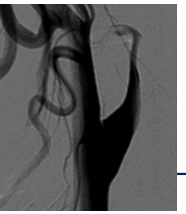
Signes directs

IRM T1 Fat sat



IRM T1 Fat sat





Traitement antithrombotique de prévention

Review: Antiplatelet vs anticoagulant in cervical dissection
Comparison: 01 antiplatelet vs anticoagulant
Outcome: 02 TIA + stroke

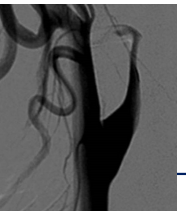
Study or sub-category	Antiplatelet n/N	Anticoagulant n/N	RD (fixed) 95% CI	Weight %	RD (fixed) 95% CI
Berne J[12]	0/5	0/3		1.73	0.00 (–0.39 and 0.39)
Fisher CM[31]	1/1	0/2		0.62	1.00 (0.27 and 1.73)
Luken M[29]	1/2	0/1		0.62	0.50 (–0.32 and 1.32)
Friedman W[24]	0/1	0/4		0.74	0.00 (–0.66 and 0.66)
Richaud J[34]	0/1	0/5		0.77	0.00 (–0.64 and 0.64)
Zelenock G[41]	0/1	0/1		0.46	0.00 (–0.85 and 0.85)
Sellier N[36]	0/13	0/16		6.62	0.00 (–0.13 and 0.13)
Chen S[16]	0/6	0/1		0.79	0.00 (–0.63 and 0.63)
Vanneste J[39]	0/1	0/4		0.74	0.00 (–0.66 and 0.66)
Biller J[13]	0/5	1/6		2.52	–0.17 (–0.54 and 0.21)
Mokri B[32]	0/13	1/7		4.20	–0.14 (–0.43 and 0.14)
Bogousslavsky J[15]	0/2	0/19		1.67	0.00 (–0.43 and 0.43)
Landre E[27]	0/3	0/2		1.11	0.00 (–0.53 and 0.53)
Marx A[30]	0/1	0/6		0.79	0.00 (–0.63 and 0.63)
Biousse V[14]	0/1	1/3		0.69	–0.33 (–1.10 and 0.43)
De Bray J[18]	0/2	0/4		1.23	0.00 (–0.50 and 0.50)
Eljamel M[22]	1/1	1/4		0.74	0.75 (0.03 and 1.47)
Kaps M[26]	0/2	0/4		1.23	0.00 (–0.50 and 0.50)
Schievink W[35]	0/5	0/2		1.32	0.00 (–0.48 and 0.48)
Ast G[11]	0/21	2/30		11.40	–0.07 (–0.18 and 0.05)
Li M[28]	0/1	1/4		0.74	–0.25 (–0.97 and 0.47)
Sturzenneger M[37]	0/8	0/34		5.98	0.00 (–0.15 and 0.15)
Colella J[17]	0/2	0/12		1.58	0.00 (–0.43 and 0.43)
Pego R[33]	0/2	0/6		1.38	0.00 (–0.46 and 0.46)
Srinivasan J[1]	1/8	0/9		3.91	0.13 (–0.15 and 0.40)
Treiman G[38]	0/6	0/12		3.69	0.00 (–0.22 and 0.22)
Eachempati S[21]	0/5	0/8		2.84	0.00 (–0.27 and 0.27)
Engelter S[23]	0/8	3/25		5.60	–0.12 (–0.32 and 0.08)
Droste D[19]	1/4	2/15		2.92	0.12 (–0.34 and 0.57)
Hasan I[25]	0/15	0/7		4.41	0.00 (–0.19 and 0.19)
Wahl W[40]	0/7	0/7		3.23	0.00 (–0.24 and 0.24)
Beletsky V[2]	2/23	3/71		16.04	0.04 (–0.08 and 0.17)
Dzeiwas R[20]	6/9	2/113		7.70	0.65 (0.34 and 0.96)
Total (95% CI)	185	447		100.00	0.05 (–0.01 and 0.11)

Total events: 13 (antiplatelet), 17 (anticoagulant)
Test for heterogeneity: $\chi^2 = 39.95$, df = 32 (p = 0.16), $I^2 = 19.9\%$
Test for overall effect: Z = 1.60 (p = 0.11)

–1.0 –0.5 0 0.5 1.0
Antiplatelet Anticoagulant

➔ **Anticoagulation empirique basée sur le mécanisme**

- AVK 3 à 6 mois (pas de place pour les AOD)
- puis AAP ou rien en fonction de l'évolution radiologique



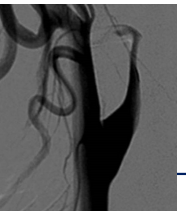
Traitement antithrombotique de prévention

➔ **Anticoagulation empirique basée sur le mécanisme (consensus d'experts)**

➔ **Pas de confirmation de son intérêt (étude CADISS)**

	Intention-to-treat population			
	Antiplatelet group (n=126)	Anticoagulant group (n=124)	OR (95% CI)*	p value
Ipsilateral stroke or death	3 (2%)	1 (1%)	0·335 (0·006–4·233)	0·63
Secondary endpoints				
Any stroke or death	3 (2%)	1 (1%)	0·335 (0·006–4·233)	0·63
Any stroke, death, or major bleed	3 (3%)	2 (2%)	0·673 (0·055– 5·983)	1·00
Any stroke	3 (2%)	1 (1%)	0·335 (0·006–4·233)	0·63
Ipsilateral stroke, TIA, or death	4 (3%)	5 (4%)	1·280 (0·268–6·614)	0·98
Any stroke or TIA	5 (4%)	5 (4%)	1·017 (0·228–4·540)	1·00
Major bleeding	0 (0%)	1 (1%)	..	..
Death	0 (0%)	0 (0%)	..	..

Etude CADISS. *Lancet Neurology*. 2015.



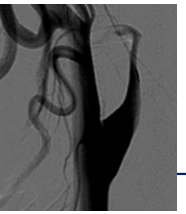
Chirurgie, Neuroradiologie interventionnelle

➔ **Indications rares (interventionnelle ++)**

➔ **Pas d'indication dans les pseudo-anévrismes disséquant cervicaux**

➔ **Indication discutée:**

- Echec du traitement antithrombotique
- Récidives d'accidents de type hémodynamique associée à une sténose courte



Recommandations thérapeutiques

➔ Dissection artérielle

Recommendations for Dissection
Referenced studies that support recommendations are summarized in online Data Supplements 43 and 44.

COR	LOE	Recommendations
1	C-EO	1. In patients with ischemic stroke or TIA after an extracranial carotid or vertebral arterial dissection, treatment with antithrombotic therapy for at least 3 months is indicated to prevent recurrent stroke or TIA.
2a	B-R	2. In patients with ischemic stroke or TIA who are <3 months after an extracranial carotid or vertebral arterial dissection, it is reasonable to use either aspirin or warfarin to prevent recurrent stroke or TIA.[593,594]
2b	C-LD	3. In patients with stroke or TIA and extracranial carotid or vertebral artery dissection who have recurrent events despite antithrombotic therapy, endovascular therapy may be considered to prevent recurrent stroke or TIA.[595,596]

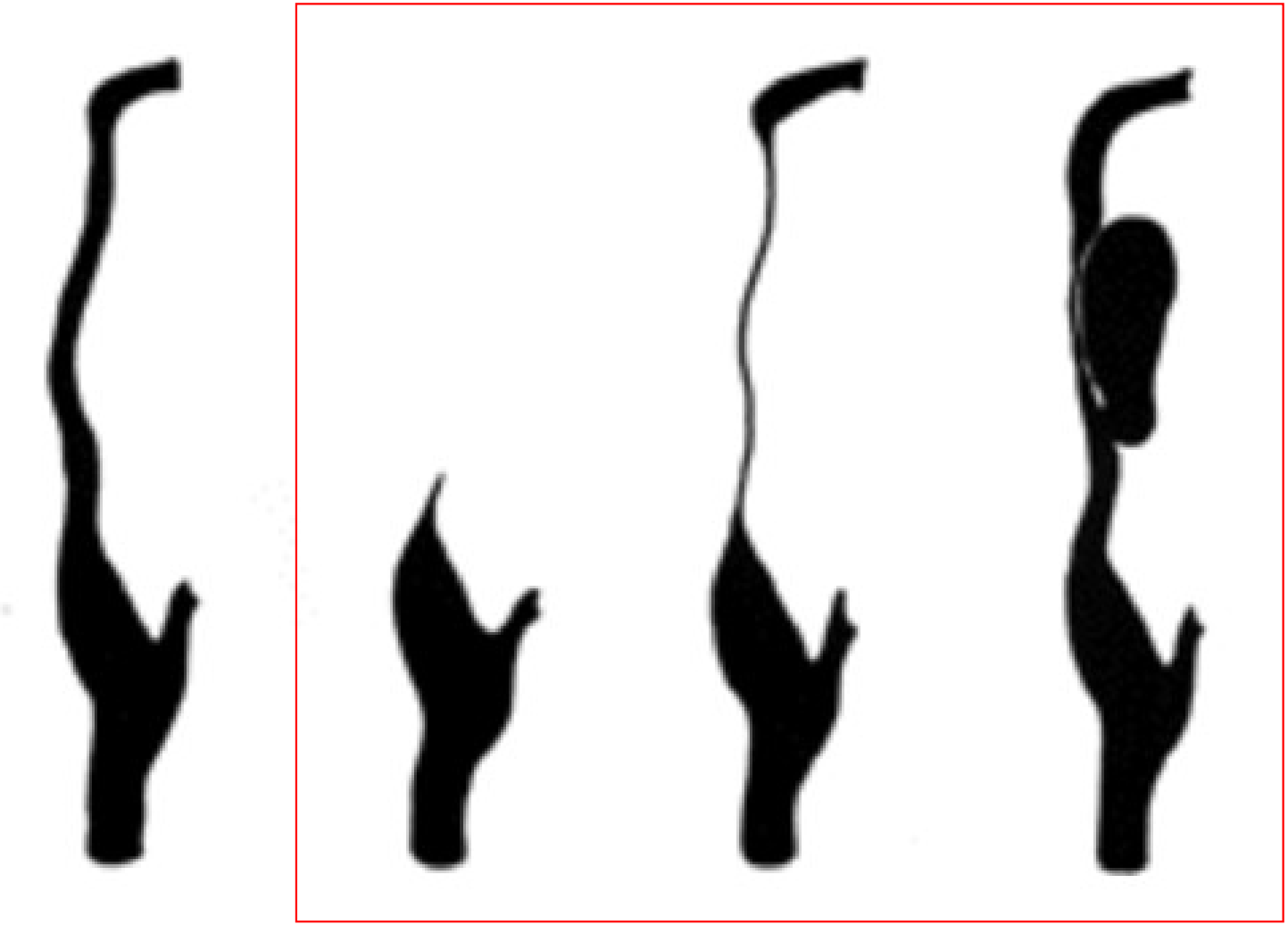
➔ DFM

Recommendations for Fibromuscular Dysplasia
Referenced studies that support recommendations are summarized in online Data Supplement 54.

COR	LOE	Recommendations
1	C-LD	1. In patients with fibromuscular dysplasia (FMD) and a history of ischemic stroke or TIA without other attributable causes, antiplatelet therapy, BP control, and lifestyle modification are recommended for the prevention of future ischemic events.[752,753]
2a	C-EO	2. In patients with a history of ischemic stroke or TIA attributable to dissection, with FMD, and no evidence of intraluminal thrombus, it is reasonable to administer antiplatelet therapy for the prevention of future ischemic events.
2b	C-LD	3. In patients with cervical carotid artery FMD and recurrent ischemic stroke without other attributable causes despite optimal medical management, carotid angioplasty with or without stenting may be reasonable to prevent ischemic stroke.[754]

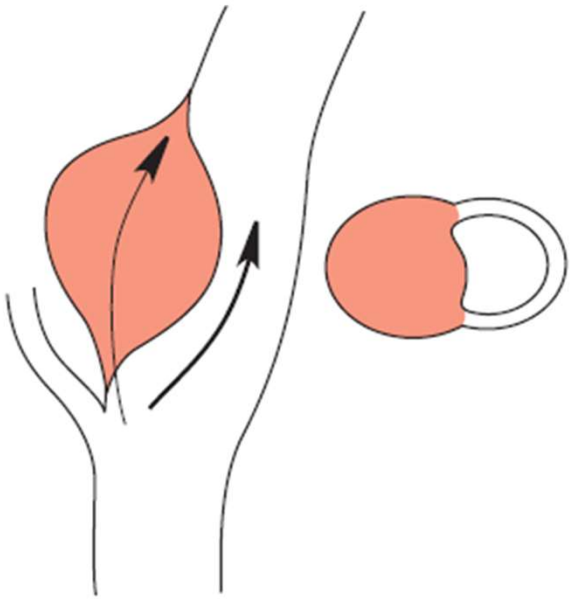
Kleindorfer et al. *Stroke*. 2021.

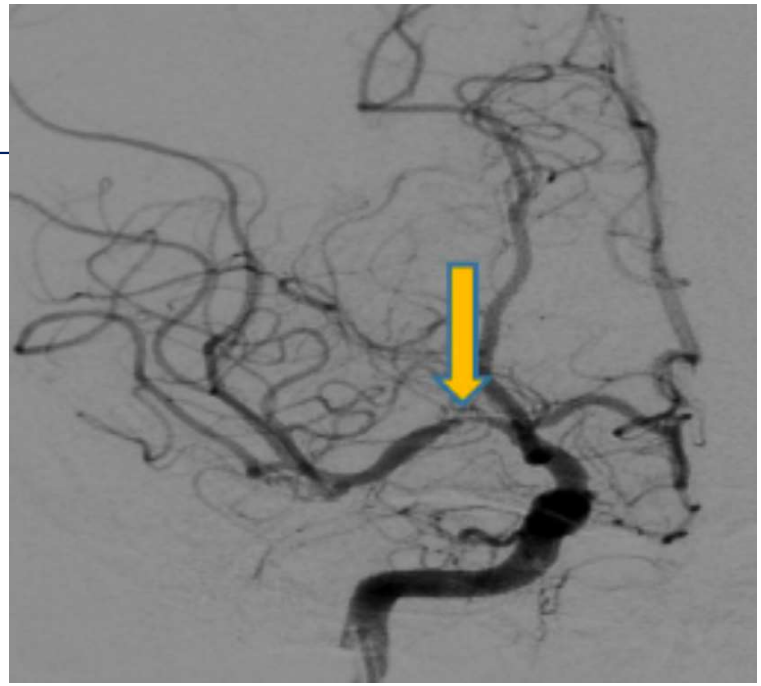
Traitement antithrombotique de prévention au long cours ?



➔ **Classiquement AAP**

Cas particulier des dissections intracrâniennes



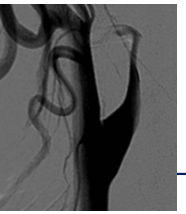


Dissection sous-adventitielle (Media/adventice)

➔ Pseudo anévrisme disséquant
➔ Ruptures (HSA)

➔ **Balance bénéfice/risque du traitement antithrombotique ??**

➔ **Recours à la neuroradiologie interventionnelle (HSA)**



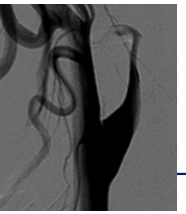
Evolution

- **Pronostic fonctionnel et vital:** lié à la survenue d'un AVC (score NIHSS)
- **Risque de récidive d'infarctus cérébral:** < 1%/an ***(Schievink 1994, Touzé 2003, Lee 2006)***
- **Evolution radiologique (90% stabilisée à M3):** ➔ *argument diagnostique à postériori*
  - 60% recanalisation complète, 20% occlusion ***(Nedeltchev 2008)***
  - Forme occlusive (50% de recanalisation)
  - Forme sténosante (80% de recanalisation complète)
  - Forme anévrismale

Cas du pseudo-anévrisme disséquant carotidien

➔ **<u>Risques théoriques:</u>**

- **Rupture:** NON en localisation cervical
- **Thrombo-embolie** à partir du sac anévrismal
- Etudes de suivi 3 à 6,5 ans ***(Guillon 1999, Touzé 2001, Benninger 2007)***
- Sous **antiplaquettaire au long cours**: pas de complications
- Pas d'indication interventionnelle



Cas de Mme A.

- Madame A., 37 ans d'origine africaine

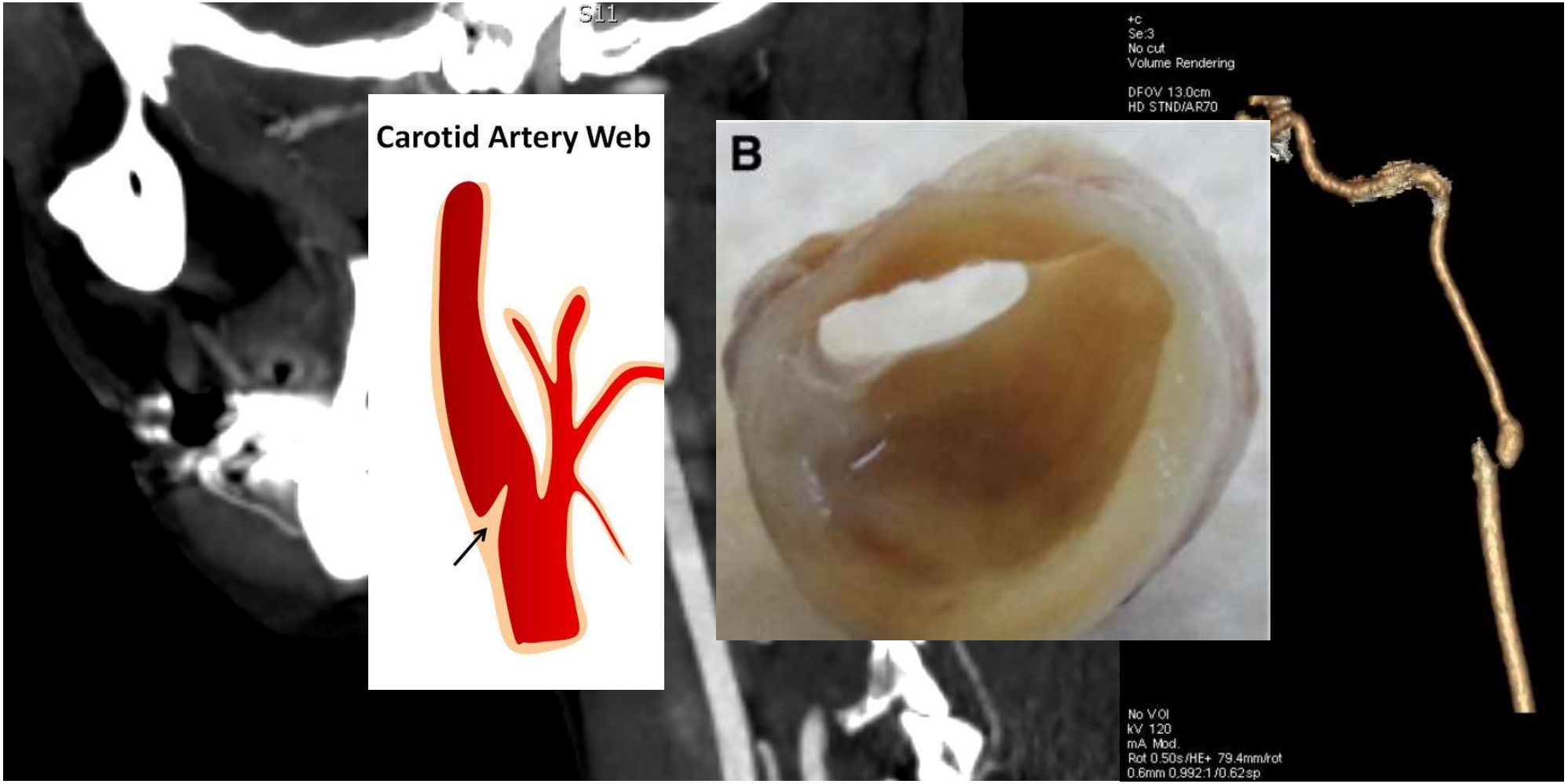
- **Antécédents:**
  - Tabagisme actif (10 PA)
  - Consommation occasionnelle de cannabis
  - Mars 2017: Amaurose brève OG 1 mois (Pas de bilan)
  - Avril 2017: Admise pour déficit neurologique rapidement régressif (Manque du mot, PFC droite, dysarthrie)
    AVCI jonctionnel rapporté à une dissection CIG ➔ AVK 3 mois puis AAP

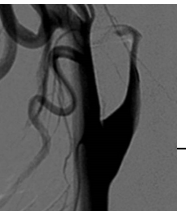
- **Admise en 2018 pour récidive d'AIT carotidien gauche**

- **Aspect inchangé de la dissection de CIG sténosante**

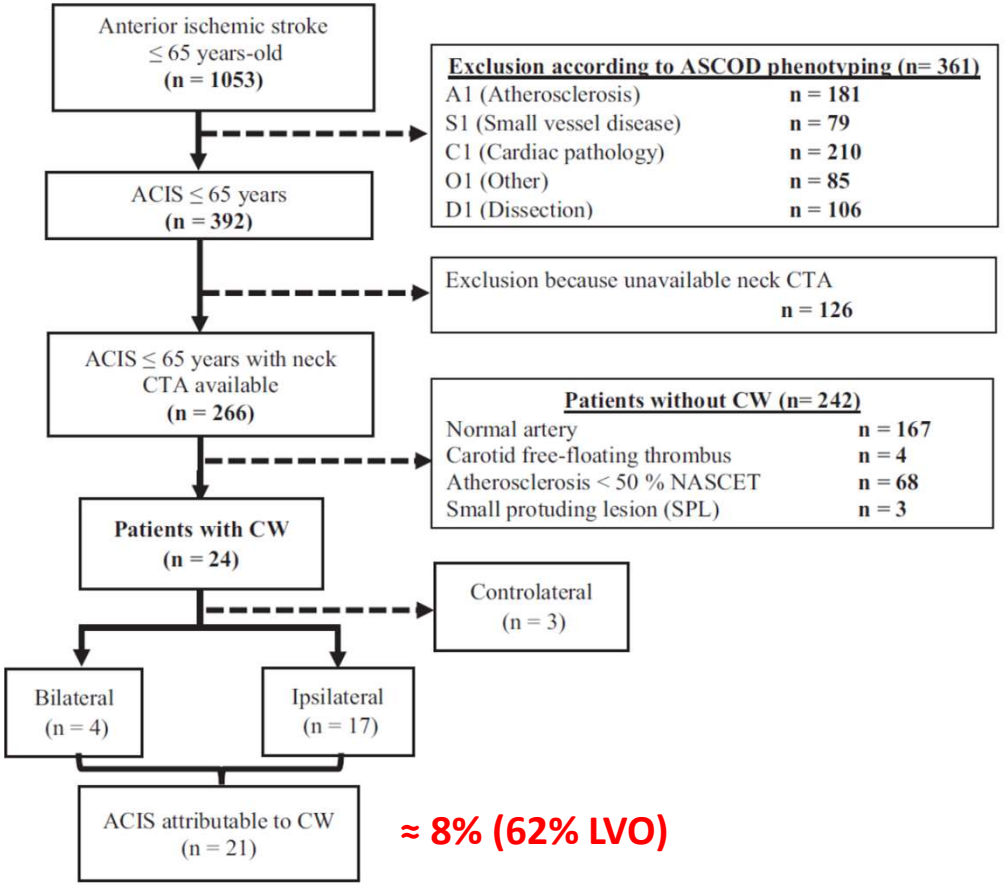
➔ **Traitement ?**

Cas de Mme A.


S11
+c
Se:3
No cut
Volume Rendering
DFOV 13.0cm
HD STND/AR70
Carotid Artery Web
B
No VOI
kV 120
mA Mod.
Rot 0.50s/HE+ 79.4mm/rot
0.6mm 0.992:1/0.62sp

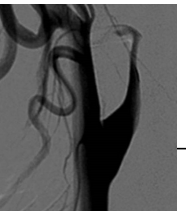


Web carotidien: pour le trouver, il faut le chercher !



≈ 8% (62% LVO)

Turpinat C, et al. *J Neurol Sci*. 2021.



Quid de la stratégie de prévention secondaire?

Recommendations for Carotid Web
Referenced studies that support recommendations are summarized in online Data Supplement 53.

COR	LOE	Recommendations
1	B-NR	1. In patients with carotid web in the distribution of ischemic stroke and TIA, without other attributable causes of stroke, antiplatelet therapy is recommended to prevent recurrent ischemic stroke or TIA.[748,749]
2b	C-LD	2. In patients with carotid web in the distribution of ischemic stroke refractory to medical management, with no other attributable cause of stroke despite comprehensive workup, carotid stenting or CEA may be considered to prevent recurrent ischemic stroke.[748–750]

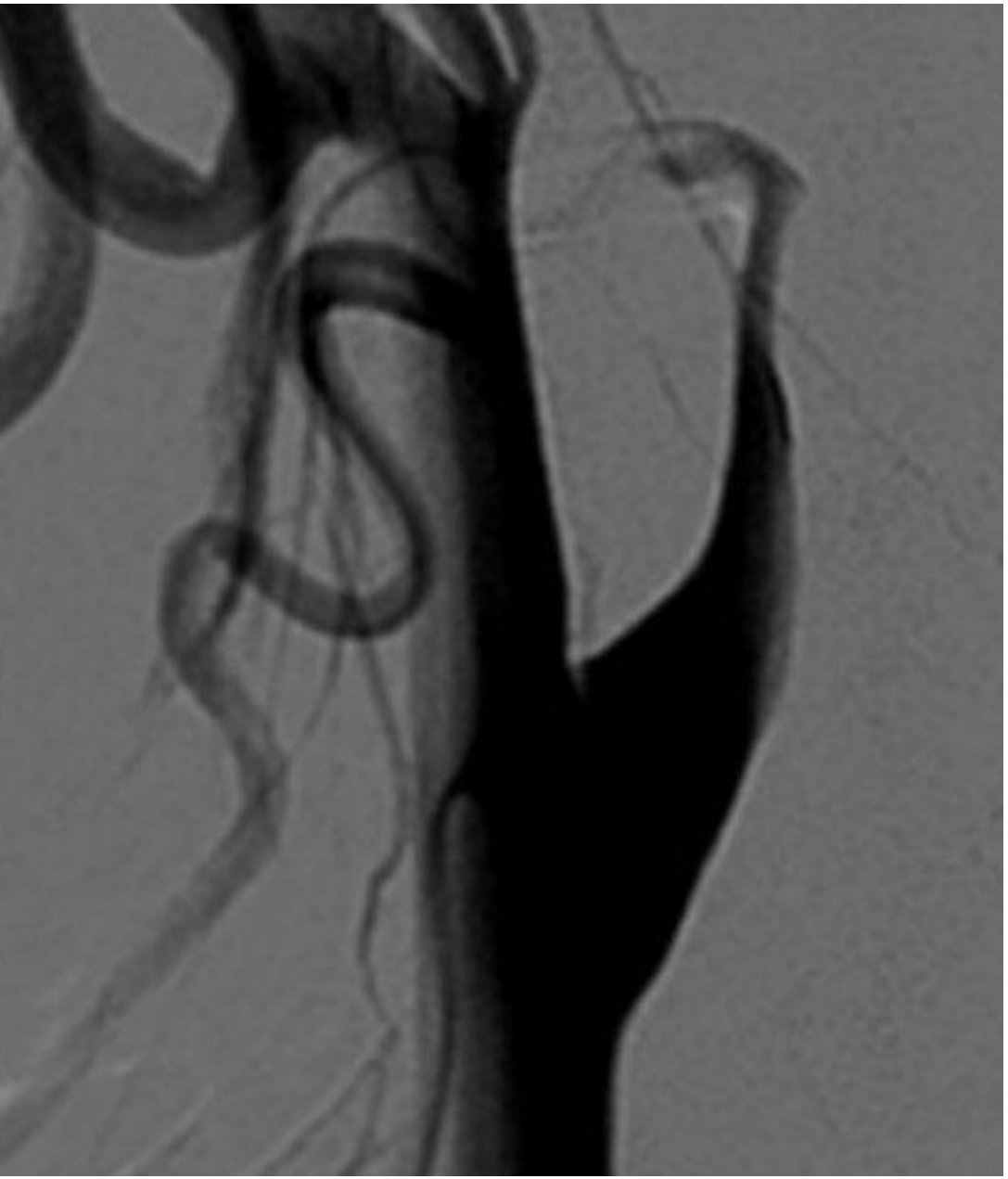
American Heart Association | American Stroke Association
life is why

Kleindorfer DO et al. *Stroke.* 2021.

- Femmes
- **Jeunes**
- Origine africaine (caribéens, Nord américains)
- **2/3 LVO**
- **1/3 récidives sous AAP**

- **Recours fréquent à chirurgie ou l'endovasculaire malgré l'absence d'essais randomisés**

Olindo S, et al. *Rev Neurol.* 2021.



Dissections & WEB carotidiens:

le plus difficile c'est d'y penser !