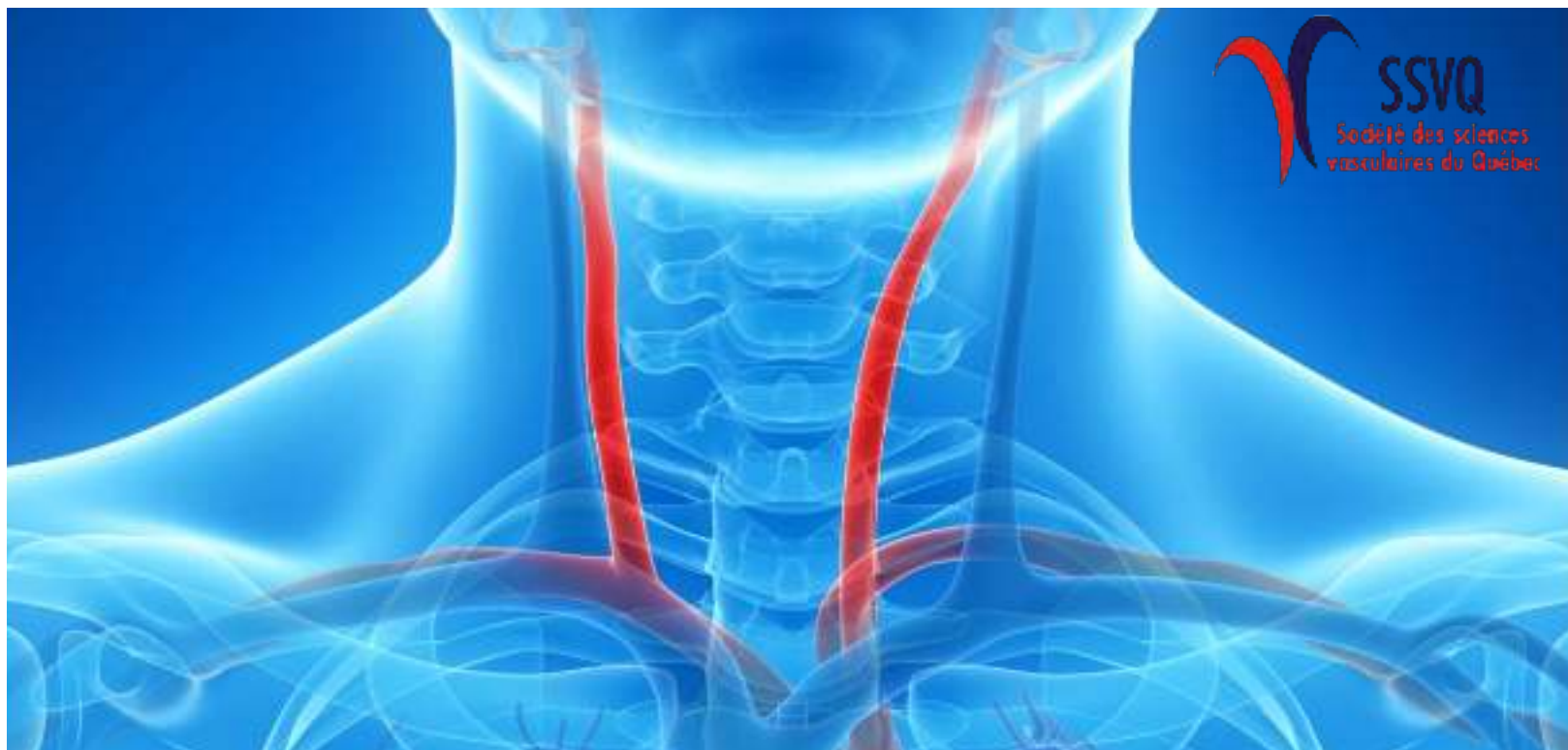




STÉNOSE CAROTIDIENNE

Philippe Charbonneau

Chirurgie vasculaire, R5

Université McGill

PLAN

- 1) Considérations générales (9 QUESTIONS/RÉPONSES)**
- 2) Timing chirurgical optimal chez le patient symptomatique
- 3) Volet technique de la chirurgie (VIDÉO)
- 4) Conclusion

PLAN

- 1) Considérations générales (9 QUESTIONS/RÉPONSES)**
- 2) Timing chirurgical optimal chez le patient symptomatique**
- 3) Volet technique de la chirurgie (VIDÉO)
- 4) Conclusion

PLAN

- 1) Considérations générales (9 QUESTIONS/RÉPONSES)**
- 2) Timing chirurgical optimal chez le patient symptomatique**
- 3) Volet technique de la chirurgie (VIDÉO)**
- 4) Conclusion

PLAN

- 1) Considérations générales (9 QUESTIONS/RÉPONSES)**
- 2) Timing chirurgical optimal chez le patient symptomatique**
- 3) Volet technique de la chirurgie (VIDÉO)**
- 4) Conclusion**

1

CONSIDÉRATIONS GÉNÉRALES

Quel est le pourcentage de l'ensemble des AVC dont l'étiologie est la sténose carotidienne?

POURCENTAGE DES AVC

D'ÉTIOLOGIE CAROTIDIENNE

15%

**Combien de Québécois seront
victimes d'un AVC d'origine
carotidienne cette année?**

STÉNOSE CAROTIDIENNE

AU QUÉBEC

120 000 Québécois ont une **sténose carotidienne** >50%

STÉNOSE CAROTIDIENNE

AU QUÉBEC

120 000 Québécois ont une **sténose carotidienne** >50%



STÉNOSE CAROTIDIENNE

AU QUÉBEC

120 000 Québécois ont une **sténose carotidienne** >50%



STÉNOSE CAROTIDIENNE

AU QUÉBEC

120 000 Québécois ont une **sténose carotidienne** >50%



2400 pts/an auront un **AVC** causé par cette sténose

**Combien de ces 2400 patients
auront eu des symptômes
neurologiques transitoires?**

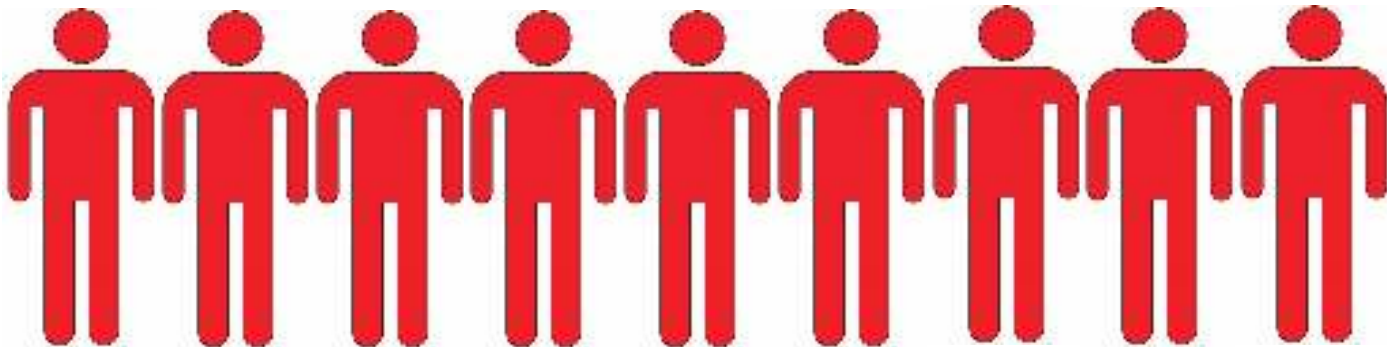
STÉNOSE CAROTIDIENNE

AU QUÉBEC

120 000 Québécois ont une **sténose carotidienne** >50%



2400 pts/an auront un **AVC** causé par cette sténose



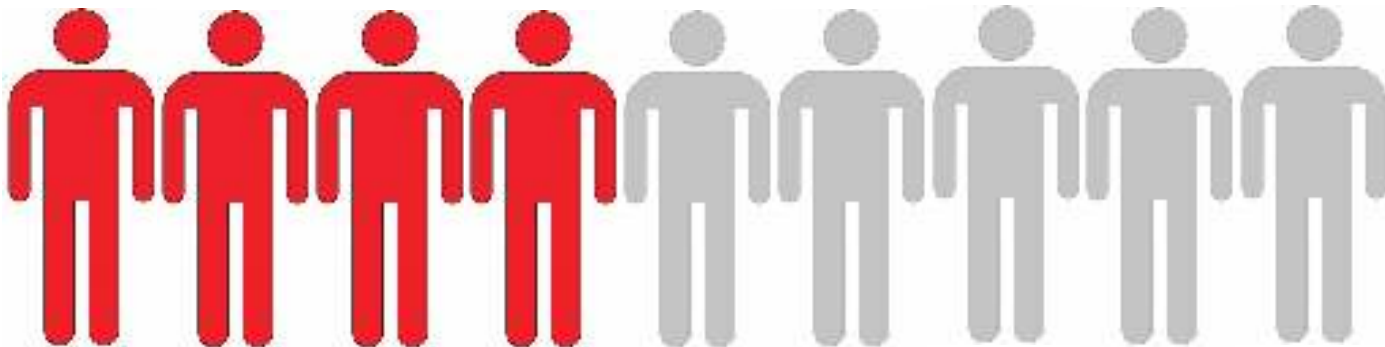
STÉNOSE CAROTIDIENNE

AU QUÉBEC

120 000 Québécois ont une **sténose carotidienne** >50%



2400 pts/an auront un **AVC** causé par cette sténose



Symptomatique: 1000 pts

Asymptomatique: 1400 pts

**Quel est le mécanisme
pathophysiologique de ce type
d'AVC?**

PATHOPHYSIOLOGIE

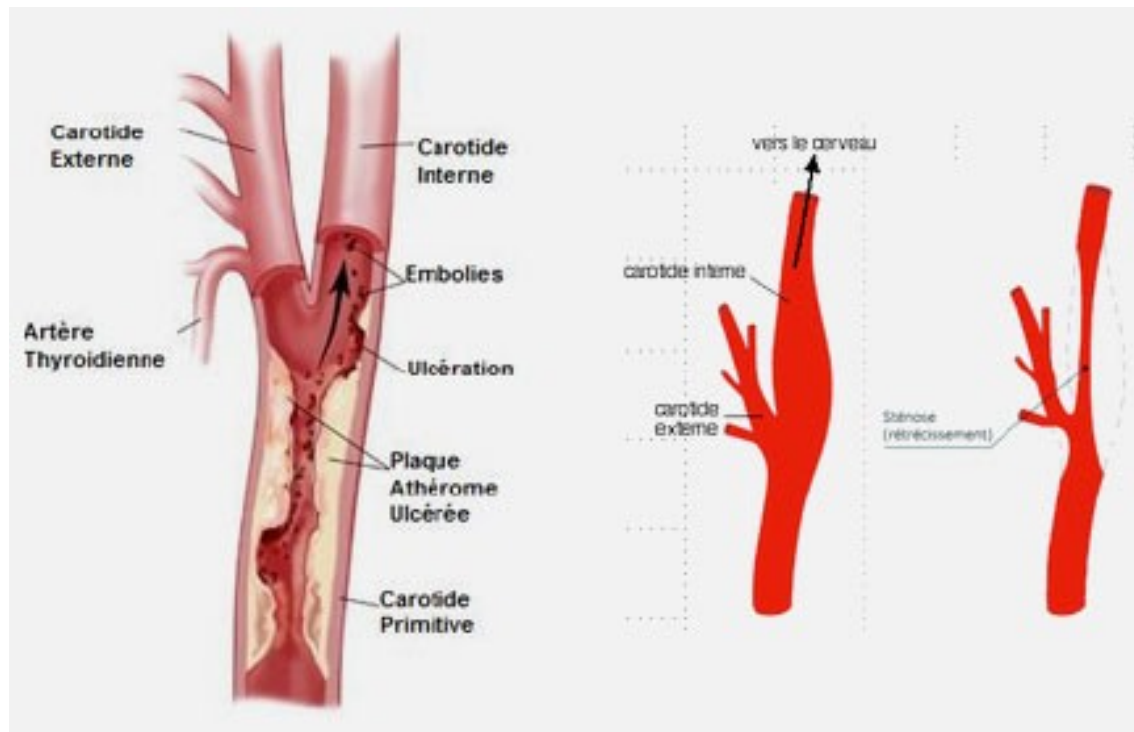
AVC d'origine carotidienne

- Phénomène embolique

PATHOPHYSIOLOGIE

AVC d'origine carotidienne

- Phénomène embolique



Quels sont les options thérapeutiques pour prévenir ces AVC?

ARSENAL THÉRAPEUTIQUE

MÉDICAL



- Modification HDV
- Contrôle glycémique
- Anti-hypertenseur
- Antiplaquettaire
- Statine

ARSENAL THÉRAPEUTIQUE

MÉDICAL



- Modification HDV
- Contrôle glycémique
- Anti-hypertenseur
- Antiplaquettaire
- Statine

CHIRURGIE



ARSENAL THÉRAPEUTIQUE

MÉDICAL



- Modification HDV
- Contrôle glycémique
- Anti-hypertenseur
- Antiplaquettaire
- Statine

CHIRURGIE



STENT



**Quel est la définition de sténose
symptomatique/asymptomatique?**

DÉFINITION

Sténose carotidienne

SYMPTOMATIQUE:

- Amaurose fugace, ICT (<24h) et AVC mineur (>24h)
- Correspond au territoire cérébral carotidien ipsilat.
- Pas d'autres causes identifiables
- < 6 mois

ASYMPTOMATIQUE:

- Jamais eu de symptôme
- ou Hx de symptômes mais > 6 mois

DÉFINITION

Sténose carotidienne

SYMPTOMATIQUE:

- **Amaurose fugace**, **ICT** (<24h) et **AVC mineur** (>24h)
- Correspond au territoire cérébral carotidien ipsilat.
- Pas d'autres causes identifiables
- < 6 mois

ASYMPTOMATIQUE:

- Jamais eu de symptôme
- ou Hx de symptômes mais > 6 mois

DÉFINITION

Sténose carotidienne

SYMPTOMATIQUE:

- **Amaurose fugace**, **ICT** (<24h) et **AVC mineur** (>24h)
- Correspond au territoire cérébral carotidien ipsilat.
- Pas d'autres causes identifiables
- < 6 mois

ASYMPTOMATIQUE:

- Jamais eu de symptôme
- ou Hx de symptômes mais > 6 mois

DÉFINITION

Sténose carotidienne

SYMPTOMATIQUE:

- **Amaurose fugace**, **ICT** (<24h) et **AVC mineur** (>24h)
- Correspond au territoire cérébral carotidien ipsilat.
- Pas d'autres causes identifiables
- < 6 mois

ASYMPTOMATIQUE:

- Jamais eu de symptôme
- ou Hx de symptômes mais > 6 mois

DÉFINITION

Sténose carotidienne

SYMPTOMATIQUE:

- **Amaurose fugace**, **ICT** (<24h) et **AVC mineur** (>24h)
- Correspond au territoire cérébral carotidien ipsilat.
- Pas d'autres causes identifiables
- **< 6 mois**

ASYMPTOMATIQUE:

- Jamais eu de symptôme
- ou Hx de symptômes mais > 6 mois

DÉFINITION

Sténose carotidienne

SYMPTOMATIQUE:

- **Amaurose fugace**, **ICT** (<24h) et **AVC mineur** (>24h)
- Correspond au territoire cérébral carotidien ipsilat.
- Pas d'autres causes identifiables
- **< 6 mois**

ASYMPTOMATIQUE:

- Jamais eu de symptôme
- ou Hx de symptômes mais > 6 mois

DÉFINITION

Sténose carotidienne

SYMPTOMATIQUE:

- **Amaurose fugace**, **ICT** (<24h) et **AVC mineur** (>24h)
- Correspond au territoire cérébral carotidien ipsilat.
- Pas d'autres causes identifiables
- **< 6 mois**

ASYMPTOMATIQUE:

- Jamais eu de symptôme
- ou Hx de symptômes mais > 6 mois

Quel est la conduite face à une sténose ASYMPTOMATIQUE?

STÉNOSE ASYMPTOMATIQUE

DÉPISTAGE

STÉNOSE ASYMPTOMATIQUE

DÉPISTAGE

- **Rôle du dépistage par duplex:**
 - ROUTINE ⇨ NON (classe III)
 - SÉLECTIF ⇨ Peut-être (classe IIb) pour Tx médical

STÉNOSE ASYMPTOMATIQUE

DÉPISTAGE

- Rôle du dépistage par duplex:
 - ROUTINE ⇨ **NON (classe III)**
 - SÉLECTIF ⇨ Peut-être (classe IIb) pour Tx médical

STÉNOSE ASYMPTOMATIQUE

DÉPISTAGE

- Rôle du dépistage par duplex:
 - ROUTINE ⇨ **NON (classe III)**
 - SÉLECTIF ⇨ **Peut-être (classe IIb) pour Tx médical**

STÉNOSE ASYMPTOMATIQUE

DÉPISTAGE

- Rôle du dépistage par duplex:
 - ROUTINE $\Rightarrow$ **NON (classe III)**
 - SÉLECTIF $\Rightarrow$ **Peut-être (classe IIb) pour Tx médical**



Si patient à haut risque d'AVC (≥ 2):

- >65 ans
- Hx familiale d'AVC
- Tabac
- HTA
- Diabète
- DLP
- MVAS
- MCAS

STÉNOSE ASYMPTOMATIQUE

INDICATION Tx

STÉNOSE ASYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ⇨ **Tous (classe I)**

- **Chx** ⇨ **Sélectif (classe IIa)**

Indication: Sténose 60-99%

+ Survie estimée > 5 ans

+ Risque opératoire (décès/AVC) < 3%

+/- homme (guidelines U.S.A.)

+ Marqueurs de risques:

1) ICT/AVC contralatéral

2) Imagerie:

-**Plaque:** écholucent, hémorragie intraplaque, progression rapide...

-**Infarctus silencieux** (CT, TCD)

- **Stent** ⇨ **Très très sélectif (classe IIb)**

- Si pas candidat chirurgical et très haut risque d'AVC

-(Décès/AVC 30jrs: Stent: 2.7% vs Chx:1.6%)*

* Rosenfield K. Metaanalysis NEJM 2016;374:101

STÉNOSE ASYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**

- **Chx** ≡ **Sélectif (classe IIa)**

Indication: Sténose 60-99%

+ Survie estimée > 5 ans

+ Risque opératoire (décès/AVC) < 3%

+/- homme (guidelines U.S.A.)

+ Marqueurs de risques:

1) ICT/AVC contralatéral

2) Imagerie:

-**Plaque:** écholucent, hémorragie intraplaque, progression rapide...

-**Infarctus silencieux** (CT, TCD)

- **Stent** ≡ **Très très sélectif (classe IIb)**

- Si pas candidat chirurgical et très haut risque d'AVC

-(Décès/AVC 30jrs: Stent: 2.7% vs Chx:1.6%)*

* Rosenfield K. Metaanalysis NEJM 2016;374:101

STÉNOSE ASYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ⇨ **Tous (classe I)**

- **Chx** ⇨ **Sélectif (classe IIa)**

Indication: Sténose 60-99%

+ Survie estimée > 5 ans

+ Risque opératoire (décès/AVC) < 3%

+/- homme (guidelines U.S.A.)

+ Marqueurs de risques:

1) ICT/AVC contralatéral

2) Imagerie:

-Plaqué: écholucent, hémorragie intraplaque, progression rapide...

-Infarctus silencieux (CT, TCD)

- **Stent** ⇨ **Très très sélectif (classe IIb)**

- Si pas candidat chirurgical et très haut risque d'AVC

-(Décès/AVC 30jrs: Stent: 2.7% vs Chx:1.6%)*

* Rosenfield K. Metaanalysis NEJM 2016;374:101

STÉNOSE ASYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** $\equiv$ **Tous (classe I)**

- **Chx** $\equiv$ **Sélectif (classe IIa)**

Indication: Sténose 60-99%

+ Survie estimée > 5 ans

+ Risque opératoire (décès/AVC) < 3%

+/- homme (guidelines U.S.A.)

+ Marqueurs de risques:

1) ICT/AVC contralatéral

2) Imagerie:

-**Plaque:** écholucent, hémorragie intraplaque, progression rapide...

-**Infarctus silencieux (CT, TCD)**

- **Stent** $\equiv$ **Très très sélectif (classe IIb)**

- Si pas candidat chirurgical et très haut risque d'AVC

-(Décès/AVC 30jrs: Stent: 2.7% vs Chx:1.6%)*

* Rosenfield K. Metaanalysis NEJM 2016;374:101

STÉNOSE ASYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**

- **Chx** ≡ **Sélectif (classe IIa)**

Indication: Sténose 60-99%

+ Survie estimée > 5 ans

+ Risque opératoire (décès/AVC) < 3%

+/- homme (guidelines U.S.A.)

+ Marqueurs de risques:

1) ICT/AVC contralatéral

2) Imagerie:

-**Plaque:** écholucent, hémorragie intraplaque, progression rapide...

-**Infarctus silencieux (CT, TCD)**

- **Stent** ≡ **Très très sélectif (classe IIb)**

- Si pas candidat chirurgical et très haut risque d'AVC

-(Décès/AVC 30jrs: Stent: 2.7% vs Chx:1.6%)*

* Rosenfield K. Metaanalysis NEJM 2016;374:101

STÉNOSE ASYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**

- **Chx** ≡ **Sélectif (classe IIa)**

Indication: Sténose 60-99%

+ Survie estimée > 5 ans

+ Risque opératoire (décès/AVC) < 3%

+/- homme (guidelines U.S.A.)

+ Marqueurs de risques:

1) ICT/AVC contralatéral

2) Imagerie:

-**Plaque**: écholucent, hémorragie intraplaque, progression rapide...

-**Infarctus silencieux** (CT, TCD)

- **Stent** ≡ **Très très sélectif (classe IIb)**

- Si pas candidat chirurgical et très haut risque d'AVC

-(Décès/AVC 30jrs: Stent: 2.7% vs Chx:1.6%)*

* Rosenfield K. Metaanalysis NEJM 2016;374:101

Quel est la conduite face à une sténose SYMPTOMATIQUE?

STÉNOSE SYMPTOMATIQUE

INDICATION Tx

STÉNOSE SYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ⇨ **Tous (classe I)**
- **Chx** ⇨ Indication: Sténose 70-99% (classe I), 50-69% (classe IIa)
 - + Risque opératoire (décès/AVC) < 6%
 - + Niveau fonctionnel
- **Stent** ⇨ (classe IIa) (*CREST: 30jrs décès/AVC stent: 6.0% vs Chx: 3.2% p=0.02)
Indication: Sténose 50-99%
 - + Risque intervention (décès/AVC) < 6%
 - + Niveau fonctionnel
 - + Chx à risque élevé: -MCAS/MPOC sévère
 - Cou hostile (RTx, Redo)
 - Paralysie n. récurrent laryngé contralat.
 - Sténose très prox. ou distale

STÉNOSE SYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**
- **Chx** ≡ **Indication: Sténose 70-99% (classe I), 50-69% (classe IIa)**
 - + Risque opératoire (décès/AVC) < 6%
 - + Niveau fonctionnel
- **Stent** ≡ (classe IIa) (*CREST: 30jrs décès/AVC stent: 6.0% vs Chx: 3.2% p=0.02)
Indication: Sténose 50-99%
 - + Risque intervention (décès/AVC) < 6%
 - + Niveau fonctionnel
 - + Chx à risque élevé: -MCAS/MPOC sévère
 - Cou hostile (RTx, Redo)
 - Paralysie n. récurrent laryngé contralat.
 - Sténose très prox. ou distale

STÉNOSE SYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**
- **Chx** ≡ **Indication: Sténose 70-99% (classe I), 50-69% (classe IIa)**
 - + **Risque opératoire (décès/AVC) < 6%**
 - + **Niveau fonctionnel**
- **Stent** ≡ (classe IIa) (*CREST: 30jrs décès/AVC stent: 6.0% vs Chx: 3.2% p=0.02)
Indication: Sténose 50-99%
 - + **Risque intervention (décès/AVC) < 6%**
 - + **Niveau fonctionnel**
 - + **Chx à risque élevé: -MCAS/MPOC sévère**
 - Cou hostile (RTx, Redo)
 - Paralysie n. récurrent laryngé contralat.
 - Sténose très prox. ou distale

STÉNOSE SYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**
- **Chx** ≡ Indication: Sténose 70-99% (**classe I**), 50-69% (classe IIa)
 - + Risque opératoire (décès/AVC) < 6%
 - + Niveau fonctionnel
- **Stent** ≡ (classe IIa) (*CREST: 30jrs décès/AVC stent: 6.0% vs Chx: 3.2% p=0.02)
 - Indication: Sténose 50-99%
 - + Risque intervention (décès/AVC) < 6%
 - + Niveau fonctionnel
 - + Chx à risque élevé: -MCAS/MPOC sévère
 - Cou hostile (RTx, Redo)
 - Paralysie n. récurrent laryngé contralat.
 - Sténose très prox. ou distale

STÉNOSE SYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**
- **Chx** ≡ Indication: Sténose 70-99% (**classe I**), 50-69% (classe IIa)
 - + Risque opératoire (décès/AVC) < 6%
 - + Niveau fonctionnel
- **Stent** ≡ (classe IIa) (*CREST: 30jrs décès/AVC stent: 6.0% vs Chx: 3.2% p=0.02)
Indication: Sténose 50-99%
 - + Risque intervention (décès/AVC) < 6%
 - + Niveau fonctionnel
 - + Chx à risque élevé: -MCAS/MPOC sévère
 - Cou hostile (RTx, Redo)
 - Paralysie n. récurrent laryngé contralat.
 - Sténose très prox. ou distale

STÉNOSE SYMPTOMATIQUE

INDICATION Tx

- **Traitement médical** ≡ **Tous (classe I)**
- **Chx** ≡ Indication: Sténose 70-99% (**classe I**), 50-69% (classe IIa)
 - + Risque opératoire (décès/AVC) < 6%
 - + Niveau fonctionnel
- **Stent** ≡ (classe IIa) (*CREST: 30jrs décès/AVC stent: 6.0% vs Chx: 3.2% p=0.02)
Indication: Sténose 50-99%
 - + Risque intervention (décès/AVC) < 6%
 - + Niveau fonctionnel
 - + Chx à risque élevé: -MCAS/MPOC sévère
 - Cou hostile (RTx, Redo)
 - Paralysie n. récurrent laryngé contralat.
 - Sténose très prox. ou distale

**Quels facteurs permettent
d'estimer le risque d'AVC chez
les patients symptomatiques?**

ESTIMATION DU RISQUE D'AVC

STÉNOSE CAROTIDIENNE SYMPTOMATIQUE

CLINIQUE

- ÂGE
- SEXE
- COMORBIDITÉS
- SYMPTÔME INITIAL
- DÉLAI AVANT CHIRURGIE
- CORTICAL vs LACUNAIRE

IMAGERIE

- TYPES DE PLAQUES
- DEGRÉ DE STÉNOSE
- OCCLUSION CONTRALATÉRALE
- LÉSION TANDEM
- RECRUTEMENT COLLATÉRAL

Henderson RD et al., Stroke

Kapoor HL et al., Stroke 1999;30:282e6

Rothwell PM et al., Lancet 2004;363:915e24.

ESTIMATION DU RISQUE D'AVC

STÉNOSE CAROTIDIENNE SYMPTOMATIQUE

CLINIQUE

- ÂGE
- SEXE
- COMORBIDITÉS
- SYMPTÔME INITIAL
- **DÉLAI AVANT CHIRURGIE**
- CORTICAL vs LACUNAIRE

IMAGERIE

- TYPES DE PLAQUES
- DEGRÉ DE STÉNOSE
- OCCLUSION CONTRALATÉRALE
- LÉSION TANDEM
- RECRUTEMENT COLLATÉRAL

Henderson RD et al., Stroke

Kapoor RL et al., Stroke 1999;30:282e6

Rothwell PM et al., Lancet 2004;363:915e24.

2

**TIMING CHIRURGICAL OPTIMAL CHEZ
LE PATIENT SYMPTOMATIQUE**

Hx NATURELLE

RISQUE AVC POST Sx INITIAL

Rothwell PM et al., Lancet 2004;363:915e24.

Fairhead JF et al., Neurology 2005;65:371e5.

Ois A et al., Stroke 2009;40:2727e31.

Bonifati DM et al., J Neurol Sci 2011;303:85e9.

Johansson EP et al., Stroke 2013;8:220e7.

Marnane M et al., Stroke 2014;45:801e6.

	48 h	2 weeks	5 years
ECST+NASCET+VA, BMT patients			21%

*Risk of stroke after TIA in patients with 50-99% carotid stenoses

Hx NATURELLE

RISQUE AVC POST Sx INITIAL

Rothwell PM et al., Lancet 2004;363:915e24.

Fairhead JF et al., Neurology 2005;65:371e5.

Ois A et al., Stroke 2009;40:2727e31.

Bonifati DM et al., J Neurol Sci 2011;303:85e9.

Johansson EP et al., Stroke 2013;8:220e7.

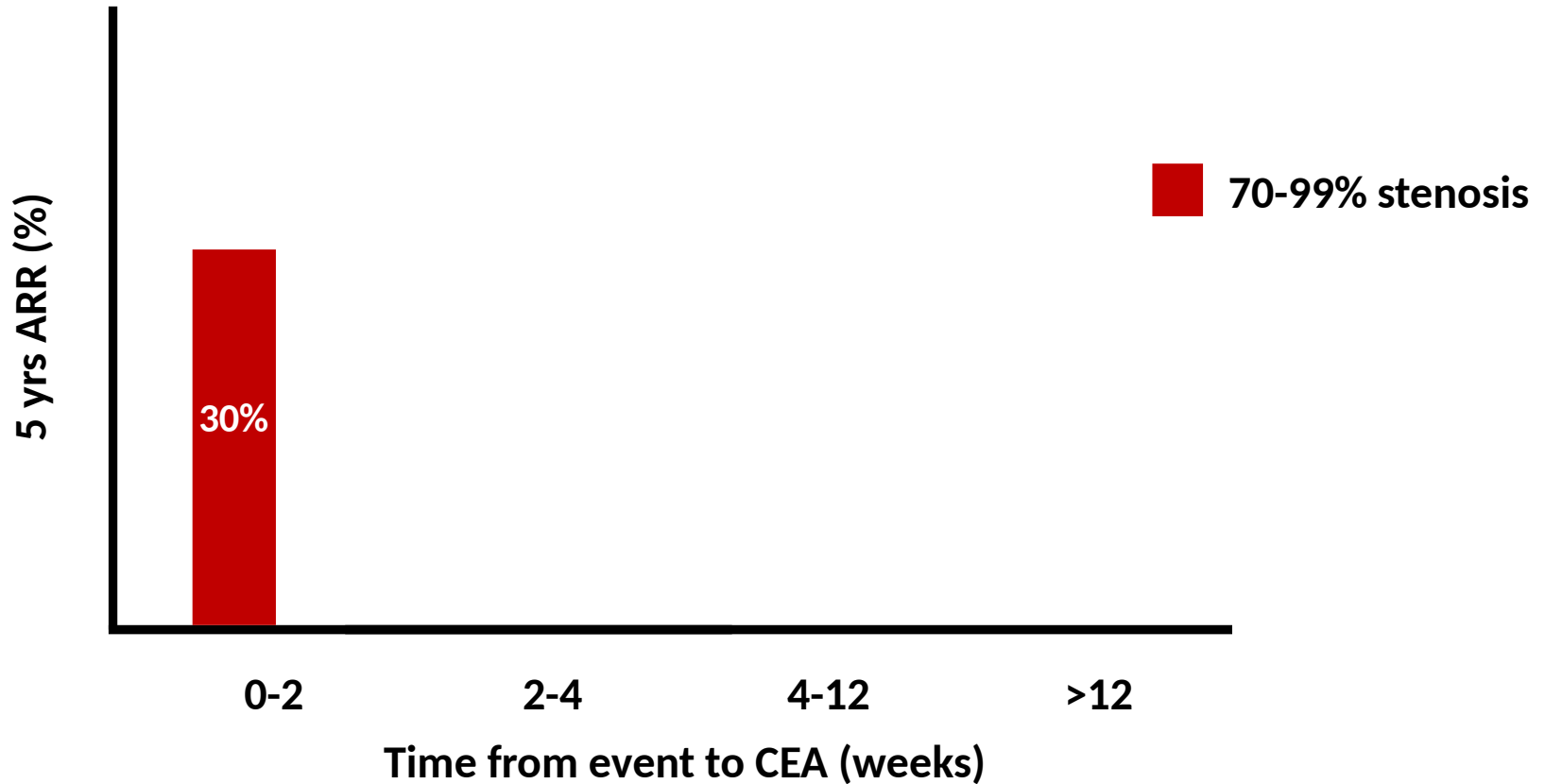
Marnane M et al., Stroke 2014;45:801e6.

	48 h	2 weeks	5 years
ECST+NASCET+VA, BMT patients			21%
Johansson <i>et al.</i>	5%	11%	
Marmane <i>et al.</i>	5%	16%	
Bonifati <i>et al.</i>	8%		
Fairhead <i>et al.</i>		20%	
Ois <i>et al.</i>		25%	

*Risk of stroke after TIA in patients with 50-99% carotid stenoses

BÉNÉFICE CHIRURGICAL

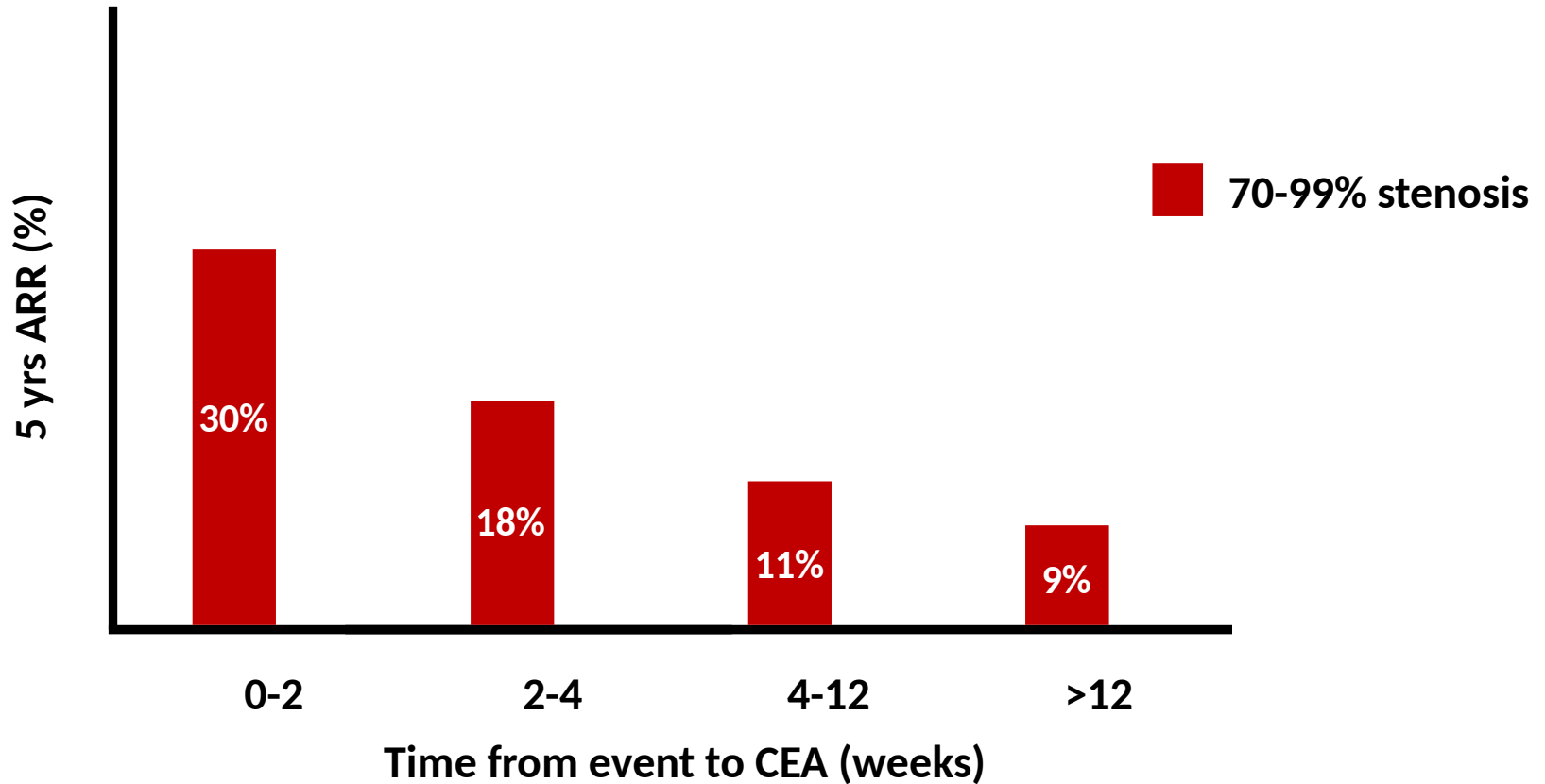
PAR RAPPORT AU TEMPS



Rothwell PM et al., Lancet 2004; 363:915.

BÉNÉFICE CHIRURGICAL

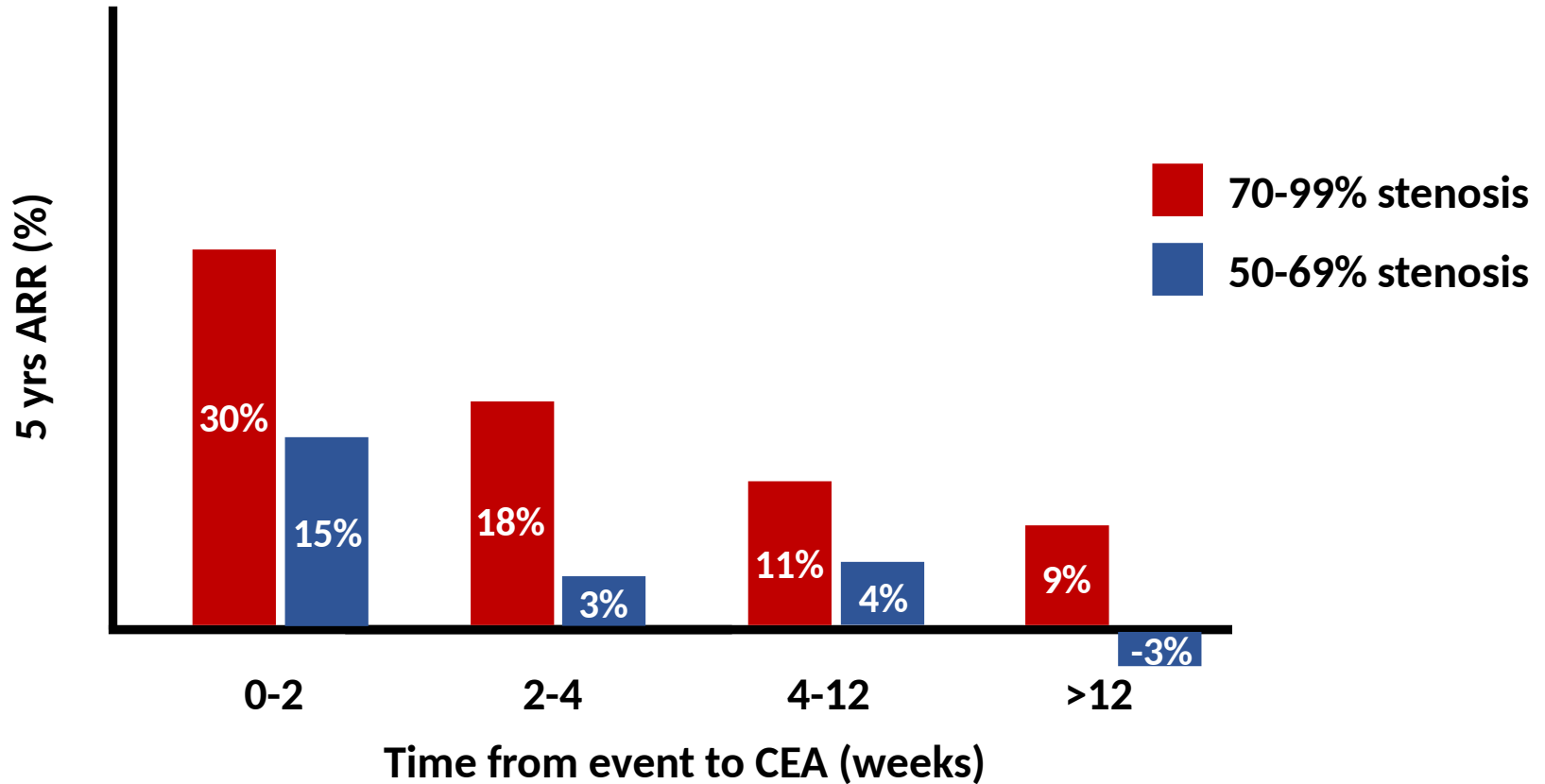
PAR RAPPORT AU TEMPS



Rothwell PM et al., Lancet 2004; 363:915.

BÉNÉFICE CHIRUGICAL

PAR RAPPORT AU TEMPS



Rothwell PM et al., Lancet 2004; 363:915.

BÉNÉFICE CHIRUGICAL

PAR RAPPORT AU TEMPS

CHx > 12 semaines NNT 125

Rothwell PM et al., Lancet 2004; 363:915.

BÉNÉFICE CHIRUGICAL

PAR RAPPORT AU TEMPS

CHx > 12 semaines NNT 125

CHx ≤ 2 semaines NNT 5

Rothwell PM et al., Lancet 2004; 363:915.

GUIDELINES

TIMING CHx

GUIDELINES RÉCENTS

TIMING Chx



ESVS 2017

Eur J Vasc Endovasc Surg (2018) 55, 3e81



AHA 2018

Stroke. 2018 Mar;49(3):e46-e110.



IJS 2017

Int J Stroke. 2017 Jan 1:1747493017743062.

GUIDELINES RÉCENTS

TIMING Chx



ESVS 2017

Eur J Vasc Endovasc Surg (2018) 55, 3e81



AHA 2018

Stroke. 2018 Mar;49(3):e46-e110.



IJS 2017

Int J Stroke. 2017 Jan 1:1747493017743062.

≤ 14 jrs (IA)

48 hrs – 7 jrs (IIA)

≤14 jrs (A)

**Opérer rapidement après le
symptôme initial est bénéfique**

**Opérer rapidement après le
symptôme initial est bénéfique**

$\text{Chx} \leq 48$ hrs trop tôt?

RISQUE PROCÉDURAL

Eur J Vasc Endovasc Surg (2015) 49, 129–136

(J Vasc Surg 2014;59:440-6.)

Very Urgent Carotid Endarterectomy Does Not Increase the Procedural Risk

B. Rantner ^{a,*}, C. Schmidauer ^b, M. Knoflach ^b, G. Friedrich ^a

^aDepartment of Vascular Surgery, Innsbruck Medical University, Innsbruck, Austria
^bDepartment of Neurology, Innsbruck Medical University, Innsbruck, Austria

A Retrospective Study on Early Carotid Endarterectomy within 48 Hours after Transient Ischemic Attack and Stroke in Evolution

A short time interval between the neurologic index event and carotid endarterectomy is not a risk factor for carotid surgery (J Vasc Surg 2017;65:12-20.)

Pavlos Tsanikas, MD,^a Andreas Kuhn, MD,^a Michael Kalimayr, MD,^b Jaroslaw Pelisek, PhD,^a Holger Poppert, MD,^c Sofia Schmid, MD,^c Alexander Zimmermann, MD,^c and Hans-Jenning Eckstein, PhD,^d Munich, Germany

From the Society for Cerebral Vascular Medicine

Outcomes of urgent carotid endarterectomy for stable and unstable acute neurologic deficits

Luigi Barbetta, MD,^a Michele Caruso, MD,^a Giulio Mercandalli, MD,^a Patricia Tattaglia, MD,^a Massimo Messori, MD,^a Alberto M. Sestini, MD,^b Raffaele Delfino, MD,^c and Massimo Tassi, MD,^d Milan, Italy

Eur J Vasc Endovasc Surg (2017) 54, 278–286

Editor's Choice — Very Urgent Carotid Endarterectomy is Associated with an Increased Procedural Risk: The Carotid Alarm Study

A. Nordandstig ^{a,b}, L. Rosengren ^{a,b}, S. Strömberg ^a, R. Österberg ^a, L. Karlsson ^a, G. Bergström ^a, Z. Fekete ^a, K. Jönd ^{a,b}

^aDepartment of Clinical Neuroscience, Institute of Neuroscience and Physiology, The Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden

^bDepartment of Neurology, Sahlgrenska University Hospital, Gothenburg, Sweden

^cInstitute of Clinical Sciences, The Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden

^dThe Sahlgrenska Centre for Cardiovascular and Metabolic Research, Wallenberg Laboratory, Institute of Medicine, The Sahlgrenska Academy at the University of Gothenburg, Gothenburg, Sweden

^eDepartment of Neurology and Rehabilitation, Södra Älvsborg Hospital, Borås, Sweden

The need for emergency surgical treatment in carotid-related stroke in evolution and crescendo transient ischemic attack

(J Vasc Surg 2012;55:1611-7.)

Laura Capoccia, MD,^a Enrico Sbarigia, MD,^a Francesco Speziale, MD,^a Danilo Toni, MD,^a Antonella Rello, MD,^a Nuccio Monteleone, MD,^a and Paolo Fiorani, MD,^a Rome, Italy

Outcomes after early and delayed carotid endarterectomy in patients with symptomatic carotid artery stenosis

Ying Huang, MD, PhD,^a Peter Glociczi, MD,^a Audra A. Duncan, MD,^a Manju Kalra, MBBS,^a Gustavo S. Oderich, MD,^a Randall R. DeMartino, MD,^a William S. Harmsen, MD,^a and Thomas C. Bower, MD,^a Minneapolis, Minn, and London, Ontario, Canada

Procedural Risk Following Carotid Endarterectomy in the Hyperacute Period after Onset of Symptoms

R. Sharpe ^a, R.D. Sayers ^a, N.J.M. London ^a, M.J. Bown ^a, M.J. McCarthy ^a, A. Nasim ^b, R.S.M. Davies ^b, A.R. Naylor ^{a,b}

^aThe Vascular Studies Unit, Leicester Royal Infirmary, Leicester, UK

^bThe Department of Vascular Surgery, Leicester Royal Infirmary, Leicester, UK

Carotid endarterectomy in the acute phase of stroke-in-evolution is safe and effective in selected patients

(J Vasc Surg 2012;55:701-7.)

Guy Loeche, MD,^a Jean-Marc Alaux, MD,^a Rabih Hourabolah, MD,^a Yves Castier, MD,^a Francis Fady, MD,^a Mikael Manganli, MD,^b and Pierre Amarenco, MD,^a Paris, France

RISQUE PROCÉDURAL

Stromberg et al. *Stroke* 2012;43:1331e5
De Rango et al., *Stroke*. 2015;46:3423-3436.

Décès/AVC à 30 jours post Chx

Sx onset to CEA

≤48h

Sweden

(n=2596)

11.5%

(17/148 pts)

META-ANALYSIS

2008-2015

De Rango et al.

5.3%

RISQUE PROCÉDURAL

Stromberg et al. *Stroke* 2012;43:1331e5
De Rango et al., *Stroke*. 2015;46:3423-3436.

Décès/AVC à 30 jours post Chx

Sx onset to CEA	≤48h	3-7days	8-14 days	> 15 days
Sweden (n=2596)	11.5% (17/148 pts)	3.6%	4.0%	5.4%
META-ANALYSIS 2008-2015 <i>De Rango et al.</i>	5.3%	3.3%	3.4%	2.3%

RISQUE PROCÉDURAL

Stromberg et al. Stroke 2012;43:1331e5
De Rango et al., Stroke. 2015;46:3423-3436.
Loftus et al., EJVS 2016;52:438e43.
Tsantilas et al., Stroke. 2016;47:2783-2790.

Décès/AVC à 30 jours post Chx

Sx onset to CEA	≤48h	3-7days	8-14 days	> 15 days
Sweden (n=2596)	11.5% (17/148 pts)	3.6%	4.0%	5.4%
META-ANALYSIS 2008-2015 <i>De Rango et al.</i>	5.3%	3.3%	3.4%	2.3%
UK (n=23,235)	3.7% (29/780 pts)	2.5%	2.1%	2.3%
Germany (n=56,279)	3.0% (157/5198 pts)	2.5%	2.6%	2.3%

GUIDELINES RÉCENTS

Chx $\leq$ 48h



Eur J Vasc Endovasc Surg (2018) 55, 3e81



Stroke. 2018 Mar;49(3):e46-e110.



Int J Stroke. 2017 Jan 1;1747493017743062.

<24 hrs
AVC en évolution ou
ICT crescendo (*IIa*)

Not well established (*IIb*)

As soon as possible
(*not specific*)

**Quel est le pourcentage des
chirurgies effectuées en
< 2 semaines?**

Proportion des chx ≤ 2 semaines

Wait times among patients with symptomatic carotid artery stenosis requiring carotid endarterectomy for stroke prevention

Prasad Jetty, MD, MSc, FRCSC,* Don Huserau, BSc, MSc,* Dalibor Kubelik, MD, FRCSC,* Sudhir Nagpal, MD, FRCSC,* Ties Beaudry, MD, FRCSC,* George Hajjar, MD, FRCSC,* Andrew Hill, MD, FRCSC,* and Michael Sharma, MD, FRCPC,* Ottawa, Ontario, Canada

An institutional study of time delays for symptomatic carotid endarterectomy

Philippe Charbonneau, MD,* Paule Lessard Bonaventure, MD,* Laura M. Drudi, MD,* Nathalie Beaudoin, MD, FRCSC,* Jean-François Blair, MD, FRCSC,* and Stéphane Elie, MD, MSc, FRCSC,* Montreal, Quebec, Canada
Journal of Vascular Surgery
Volume 64, Number 6

Structure of Delay in Carotid Surgery – An Observational Study **CME**

J. Vikatmaa^{a,*}, T. Sairanen^b, J.-M. Lindholm^b, L. Capraro^c, L. Lepäntalo^a, M. Venermo^a

^aDepartment of Vascular Surgery, Helsinki University Central Hospital
^bDepartment of Neurology, Helsinki University Central Hospital
^cDepartment of Anaesthesiology, Helsinki University Central Hospital

Am J Vasc Endovasc Surg (2017) 54, 435–442

Editor's Choice – The National Norwegian Carotid Study: Time from Symptom Onset to Surgery is too Long, Resulting in Additional Neurological Events

K.E. Kjerstad^{a,*}, S.T. Balesaas^b, D. Bundgaard^c, E. Halbakken^d, T. Hasseltvedt^e, A.M. Krog^f, K. Krogh-Sørensen^g, E. Laxdal^h, S.R. Mathiesenⁱ, G.V. Oksaas^j, B.A. Vildal^k, J. Wenzke^l, F. Aagaard^m, E. Mattssonⁿ

Delay from symptoms to carotid endarterectomy

■ E. P. Johansson & P. Wester

From the Department of Public Health and Clinical Medicine, Umeå Stroke Centre, Norrlands University Hospital, Umeå, Sweden

Proportion des chx $\leq$ 2 semaines

ÉTUDES RÉTROSPECTIVES

	2010-2011	39%
	2008-2010	8%
	2003-2006	36%
	2007-2008	11%
	2008	7%
	2006	4,5%
	2002-2006	21%
	2002-2004	6%

Charbonneau P et al., *J Vasc Surg* 2016;64:1726-33

Jetty P et al., *J Vasc Surg*. 2012 Sep;56(3):661-7.e7

Gladstone et al., *Stroke*, 40 (2009), pp. 2776-2782

Den Hartog et al., *EJVS*, 47 (2014), pp. 233-239

Gaba et al., *Surgeon*, 12 (2014), pp. 11-16

Dellagrammaticas et al., *Clin Med (Lond)*, 7 (2007), pp. 589-592

Andgren et al., *Acta Neurol Scand*, 124 (2011), pp. 329-333

Proportion des chx $\leq$ 2 semaines

ÉTUDES RÉTROSPECTIVES

	2010-2011	39%
	2008-2010	8%
	2003-2006	36%
	2007-2008	11%
	2005-2006	7%
	2003-2004	6.5%
	2001-2002	21%
	2000-2001	9%

Charbonneau P et al., *J Vasc Surg* 2016;64:1726-30
Jetty P et al., *J Vasc Surg*. 2012 Sep;56(3):661-7.e1
Gladstone et al., *Stroke*, 40 (2009), pp. 2776-2782
Den Hartog et al., *EJVS*, 47 (2014), pp. 233-239
Gaba et al., *Surgeon*, 12 (2014), pp. 11-16
Dellagrammaticas et al., *Clin Med (Lond)*, 7 (2007), pp. 589-592
Andgren et al., *Acta Neurol Scand*, 124 (2011), pp. 329-335

Proportion des chx $\leq$ 2 semaines

ÉTUDES RÉTROSPECTIVES

	2010-2011	39%
	2008-2010	8%
	2003-2006	36%

- Patient se présente tardivement (25% après 2 semaines)
- Augmentation des délais:
 - Première visite en clinique
 - Investigation en externe
 - ICT-AF comme Sx initial
 - Investigation dans un centre sans chirurgien vasculaire

Proportion des chx $\leq$ 2 semaines

REGISTRES NATIONAUX RÉCENTS



2014-2015

62%



2009-2014

72%



2009-2013

52%



2008-2011

63%

Stromberg et al. Stroke 2012;43:1331e5

Loftus et al., EJVS 2016;52:438e43.

Tsantilas et al., Stroke. 2016;47:2783-2790.

Quand reporter la chirurgie?

GUIDELINES RÉCENTS

Reporter la Chx



Eur J Vasc Endovasc Surg (2018) 55, 3e81



Stroke. 2018 Mar;49(3):e46-e110.



Int J Stroke. 2017 Jan 1:1747493017743062.

No recommendation

No recommendation

- AVC incapacitant (mRs ≥ 3)
- $\geq 1/3$ territoire ACM
- Niveau de conscience altérée (I)

Quel est le timing de la chirurgie post-thrombolyse?

GUIDELINES RÉCENTS

Chx post-thrombolyse



Eur J Vasc Endovasc Surg (2018) 55, 3e81



Stroke. 2018 Mar;49(3):e46-e110.



Int J Stroke. 2017 Jan 1:1747493017743062.

No recommendation

No recommendation

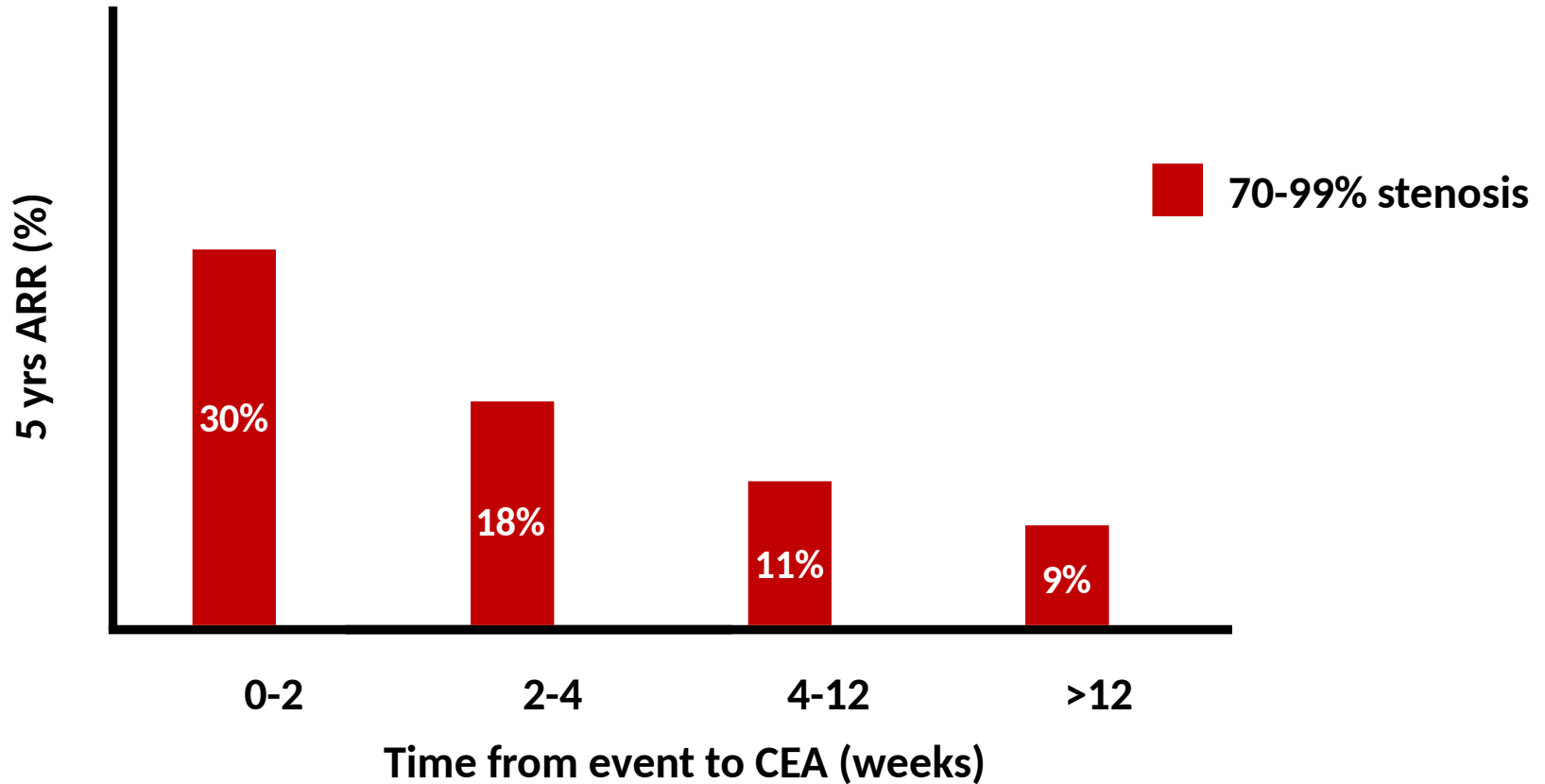
≤ 14 jrs si:

- Récupération neurologique rapide (mRs 0-2)**
- < 1/3 territoire ACM**
- Recanalisation de l'origine ACM**
- Absence d'hémorragie/oedème cérébrale (IIa)**

**À quel moment le bénéfice
chirurgical s'estompe?**

APRÈS 2 SEMAINES

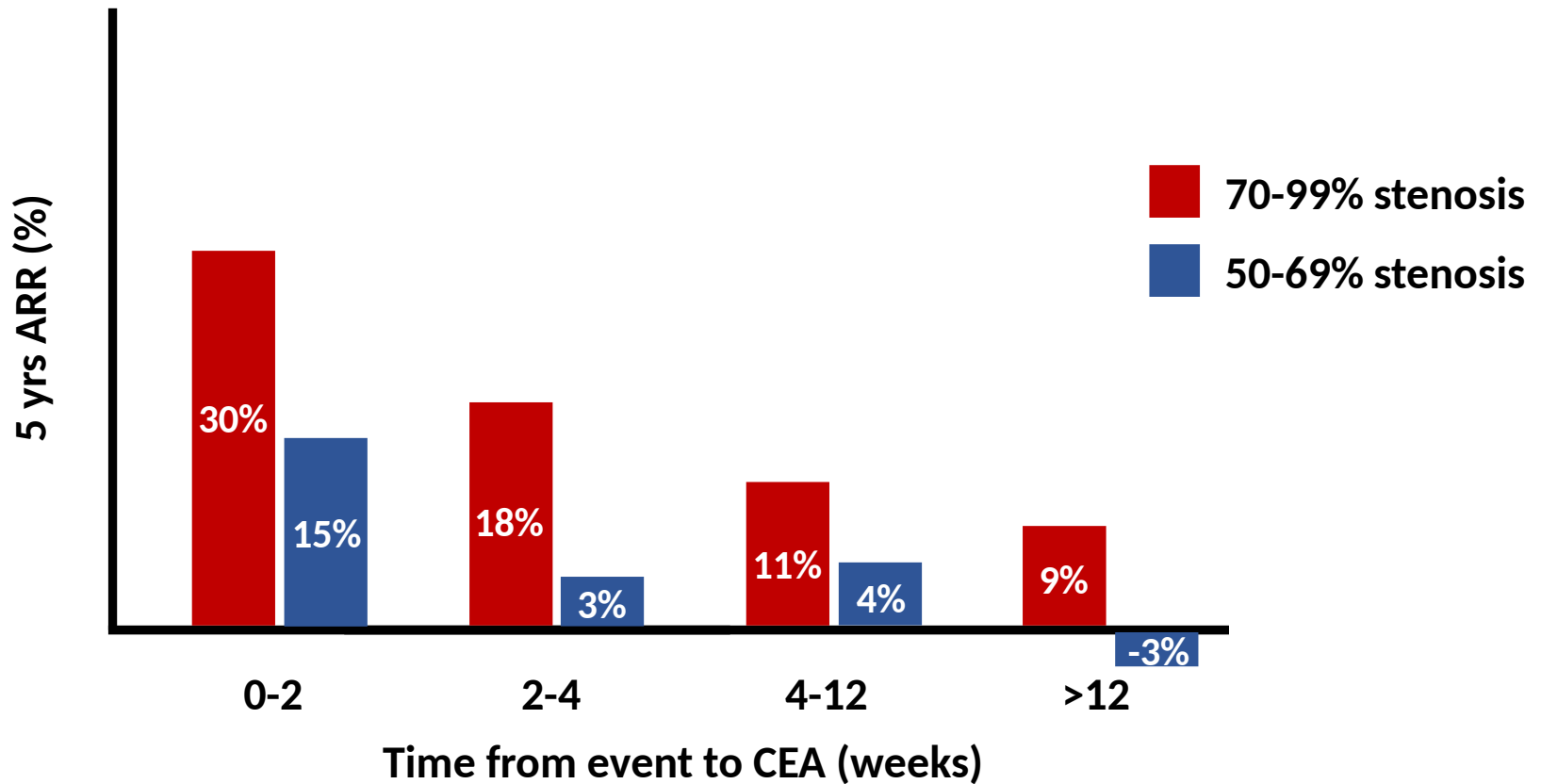
DEGRÉ DE STÉNOSE



Rothwell PM et al., Lancet 2004; 363:915.

APRÈS 2 SEMAINES

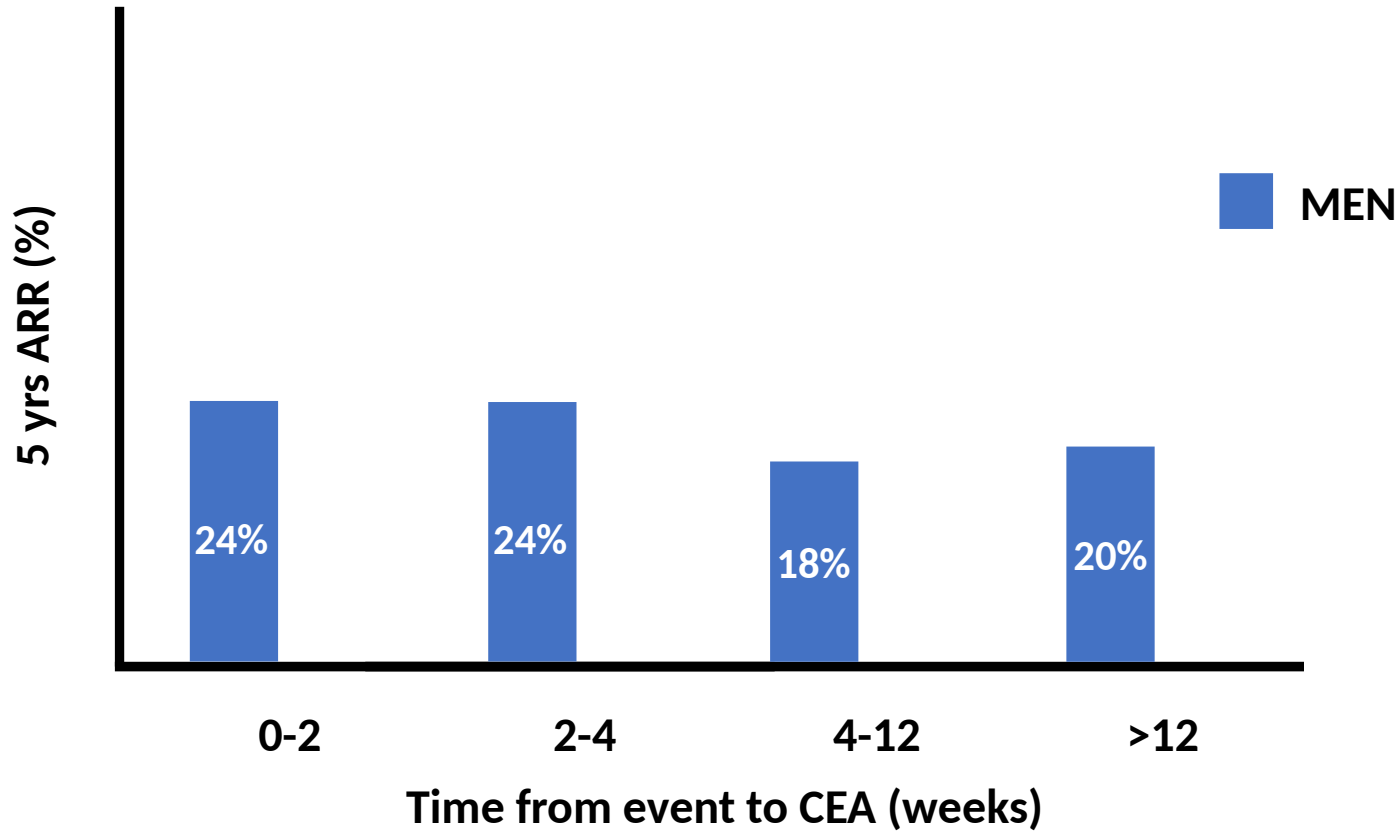
DEGRÉ DE STÉNOSE



Rothwell PM et al., Lancet 2004; 363:915.

APRÈS 2 SEMAINES

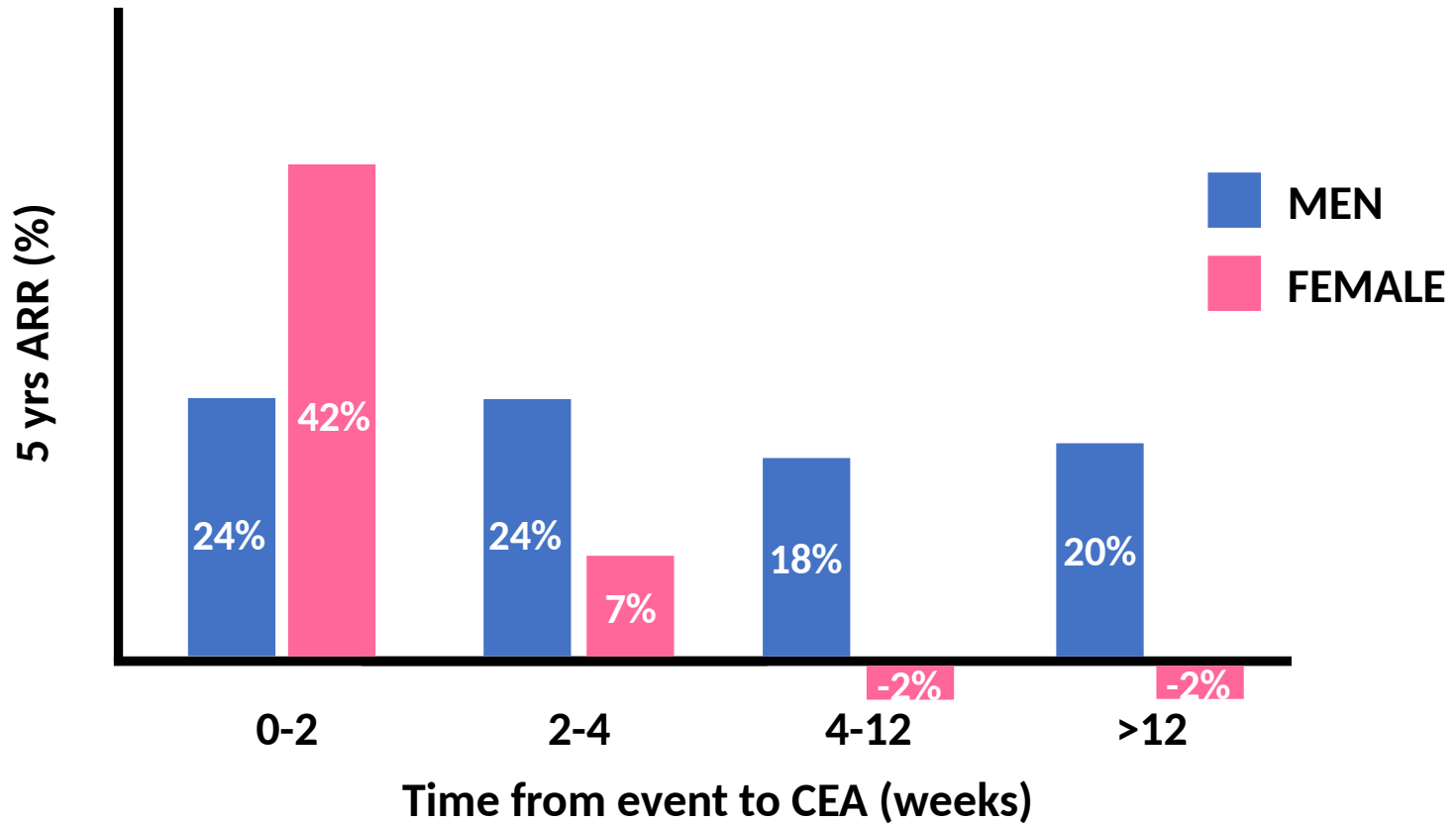
SEXE



Rothwell PM et al., Lancet 2004; 363:915.

APRÈS 2 SEMAINES

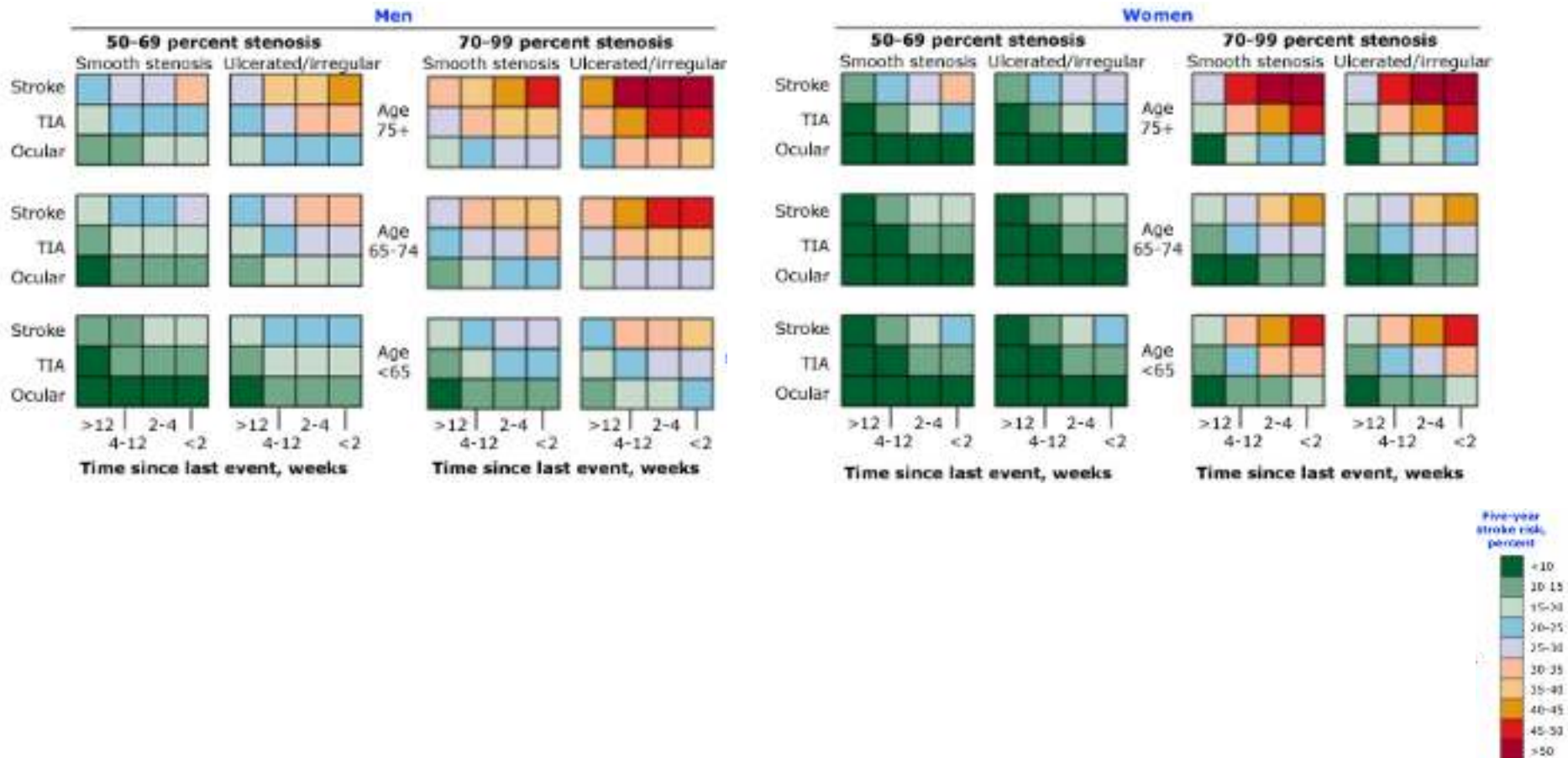
SEXE



Rothwell PM et al., Lancet 2004; 363:915.

SCORE DE PRÉDICTION AVC

STÉNOSE SYMPTOMATIQUE



Rothwell PM et al., Neurology
2005;64:947-56

3

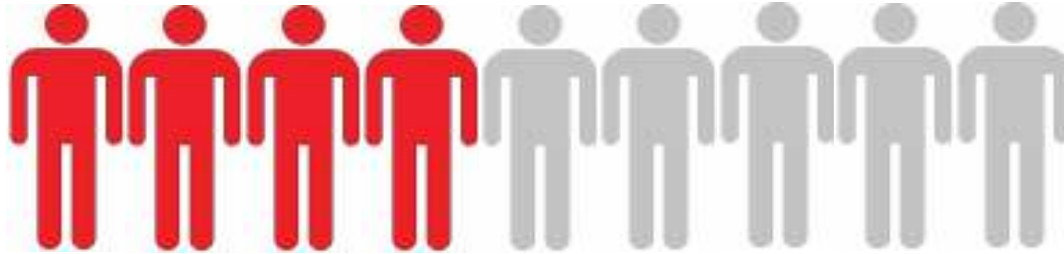
VOLET TECHNIQUE

VIDÉO

4

CONCLUSION

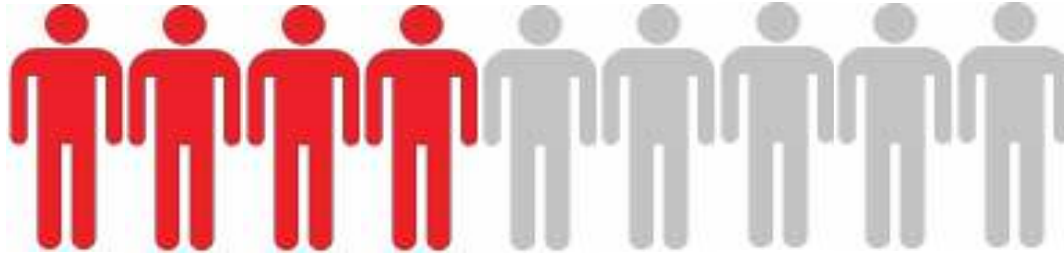
CONCLUSION



Symptomatique: 1000 pts

Asymptomatique: 1400 pts

CONCLUSION

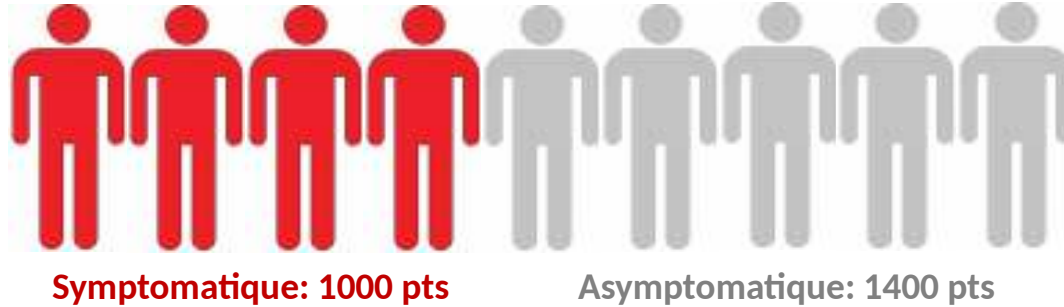


Symptomatique: 1000 pts

Asymptomatique: 1400 pts

OBJECTIF: Prévenir ces 2400 AVC annuellement

CONCLUSION

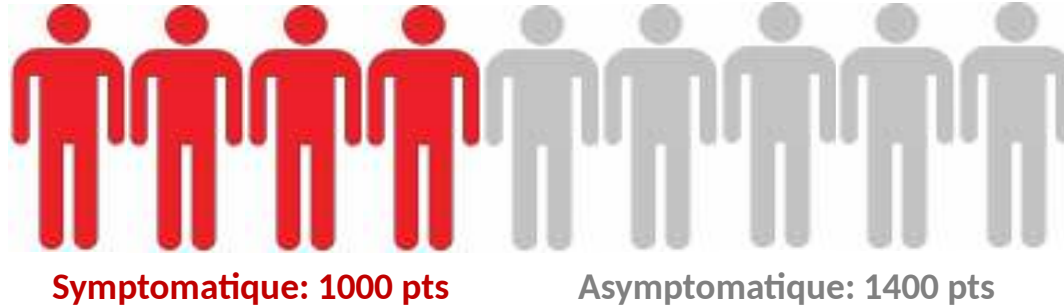


OBJECTIF: Prévenir ces 2400 AVC annuellement

1) Patient Asx:

- pas de recommandation claire de dépister
- études futures auront pour objectif d'identifier
 - Qui dépister?
 - Quel patient à haut risque d'AVC $\Rightarrow$ Chx

CONCLUSION

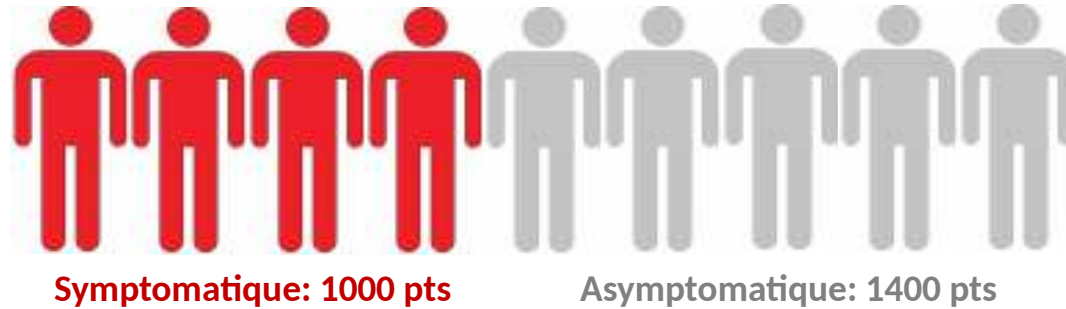


OBJECTIF: Prévenir ces 2400 AVC annuellement

1) Patient Asx:

- pas de recommandation claire de dépister
- études futures auront pour objectif d'identifier
 - Qui dépister?
 - Quel patient à haut risque d'AVC $\Rightarrow$ Chx

CONCLUSION

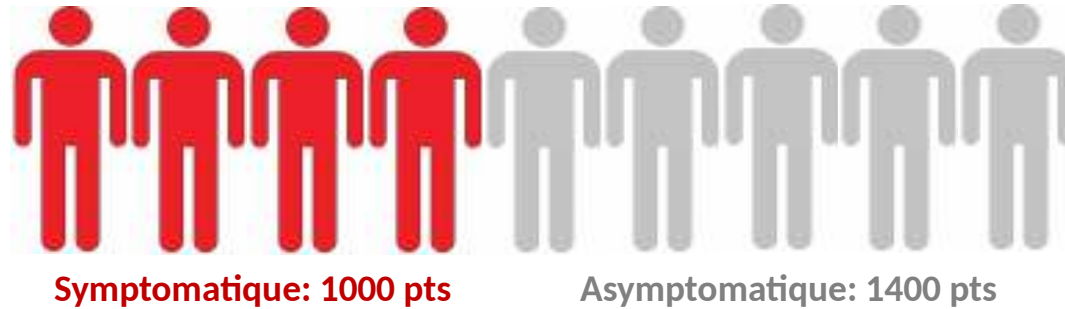


OBJECTIF: Prévenir ces 2400 AVC annuellement

1) Patient Asx:

- pas de recommandation claire de dépister
- études futures auront pour objectif d'identifier
 - Qui dépister?
 - Quel patient à haut risque d'AVC $\Rightarrow$ Chx

CONCLUSION



OBJECTIF: Prévenir ces 2400 AVC annuellement

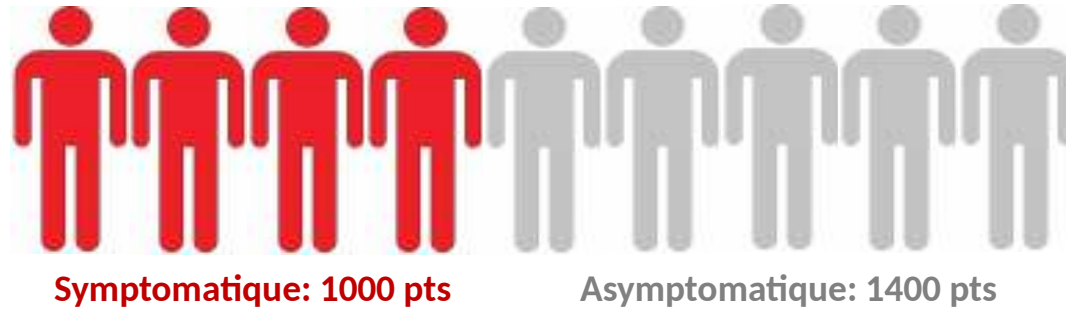
1) Patient Asx:

- pas de recommandation claire de dépister
- études futures auront pour objectif d'identifier
 - Qui dépister?
 - Quel patient à haut risque d'AVC $\equiv$ Chx

2) Patient Sx:

- Diminuer les délais
- Clarification concernant qui opérer < 48H

CONCLUSION



OBJECTIF: Prévenir ces 2400 AVC annuellement

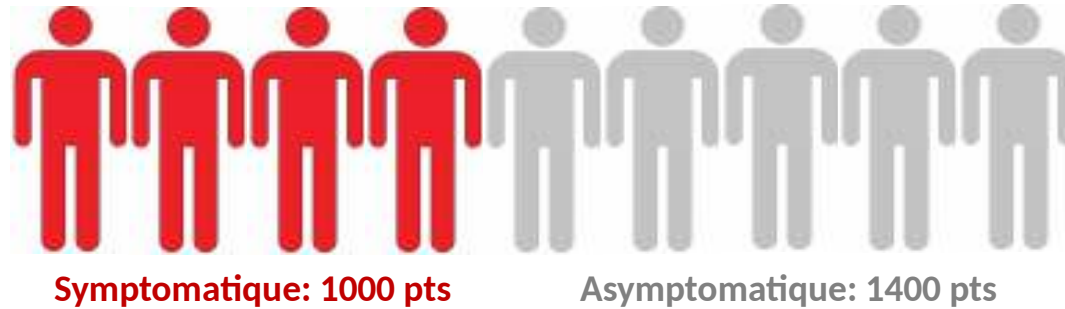
1) Patient Asx:

- pas de recommandation claire de dépister
- études futures auront pour objectif d'identifier
 - Qui dépister?
 - Quel patient à haut risque d'AVC $\equiv$ Chx

2) Patient Sx:

- Diminuer les délais
- Clarification concernant qui opérer < 48H

CONCLUSION



OBJECTIF: Prévenir ces 2400 AVC annuellement

1) Patient Asx:

- pas de recommandation claire de dépister
- études futures auront pour objectif d'identifier (ECST-2, ACST-2, CREST2)
 - Qui dépister?
 - Quel patient à haut risque d'AVC $\equiv$ Chx

2) Patient Sx:

- Diminuer les délais
- Clarification concernant qui opérer < 48H

MERCI

QUESTIONS

**Ces guidelines sont basés sur
quelles évidences?**

COMPARAISON DES TRAITEMENTS

SYMPTOMATIQUE



VS



N Engl J Med 1991; 325:445-453
Lancet. 1998 May 9;351(9113):1379-87.

COMPARAISON DES TRAITEMENTS

SYMPTOMATIQUE



VS



26%

9%

$p < 0.001$

NASCET

*(70-99%, AVC à 2 ans)

N Engl J Med 1991; 325:445-453
Lancet. 1998 May 9;351(9113):1379-87.

COMPARAISON DES TRAITEMENTS

SYMPTOMATIQUE



VS



NASCET

26%

9%

$p < 0.001$

*(70-99%, AVC à 2 ans)

ECST

21%

7%

$p < 0.0001$

*(80-99%, AVC à 3 ans)

N Engl J Med 1991; 325:445-453
Lancet. 1998 May 9;351(9113):1379-87.

COMPARAISON DES TRAITEMENTS

ASYMPTOMATIQUE



VS



JAMA. 1995 May 10;273(18):1421-8.

Lancet. 2010 Sep 25;376(9746):1074-84

COMPARAISON DES TRAITEMENTS

ASYMPTOMATIQUE



VS



ACAS

11%

5%

$p < 0.001$

*(60-99%, AVC à 5 ans)

JAMA. 1995 May 10;273(18):1421-8.

Lancet. 2010 Sep 25;376(9746):1074-84

COMPARAISON DES TRAITEMENTS

ASYMPTOMATIQUE



VS



ACAS

11%

5%

$p < 0.001$

*(60-99%, AVC à 5 ans)

ACST

12%

6%

$p < 0.0001$

*(70-99%, AVC à 5 ans)

JAMA. 1995 May 10;273(18):1421-8.

Lancet. 2010 Sep 25;376(9746):1074-84

COMPARAISON DES TRAITEMENTS

SYMPTOMATIQUE



VS



COMPARAISON DES TRAITEMENTS

SYMPTOMATIQUE



VS



EVA-3S

10%

4%

SPACE

7%

6%

ICSS

9%

5%

CREST

6%

3%

(Décès et AVC à 30 jours)*

COMPARAISON DES TRAITEMENTS

[Lancet Neurol.](#) 2008 Oct;7(10):885-92
[Lancet.](#) 2006 Oct 7;368(9543):1239-47
[Lancet.](#) 2015 Feb 7;385(9967):529-38.
[Stroke.](#) 2010 Oct;41(10 Suppl):S31-4.
Rosenfield K NEJM 2016;374:1011e20.

ASYMPTOMATIQUE



VS



SPACE-2	2.5%	2.0%	
ACT-1	2.9%	1.7%	
CREST-1	2.5%	1.4%	
SAPPHIRE	5.8%	6.1%	p = NS
Métaanalyse	2.7%	1.6%	p = significative

(Décès et AVC à 30 jours)*

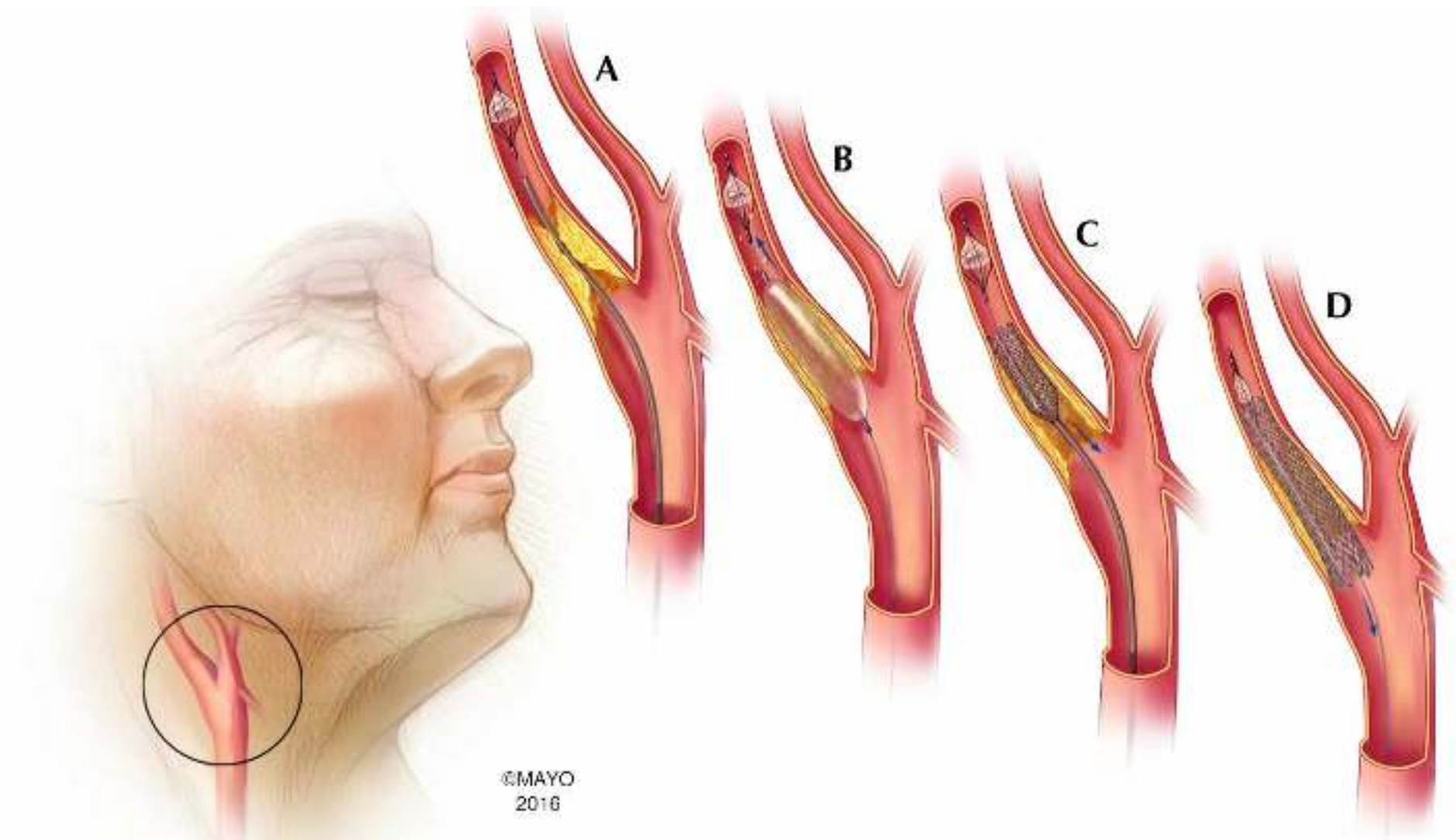
COMPARAISON DES TRAITEMENTS

SYMPTOMATIQUE

2.2.3.2.2. 'High-risk' for surgery patients. The Stenting and Angioplasty With Protection in Patients at High Risk for Endarterectomy (SAPPHIRE) study randomised 334 patients deemed "high-risk for CEA" to either CEA or CAS. The criteria for defining a "high-risk for CEA" asymptomatic patient included an asymptomatic 70–99% stenosis in the presence of one or more of: clinically significant cardiac disease (congestive heart failure, abnormal stress test, or need for open-heart surgery); severe pulmonary disease; contralateral carotid occlusion; contralateral laryngeal-nerve palsy; previous radical neck surgery, cervical radiation therapy; recurrent stenosis after CEA and age >80 years.¹⁰⁴ However, the majority of SAPPHIRE patients (70%) were asymptomatic, in whom 30-day death/stroke was 5.8% after CAS and 6.1% after CEA.^{104,105} At these levels of risk, none would gain benefit in terms of late stroke prevention, suggesting they should be treated medically.

An algorithm for managing asymptomatic patients with carotid disease is presented in Fig. 5.

CONCLUSION



CONCLUSION

CONCLUSION

BIG RCTs

Table 1. Major RCTs in North America and Europe (1980s to mid-1990s) comparing carotid endarterectomy versus medical management alone for stroke prevention

RCT	Severity of stenosis (%)	30-day surgical CSM (%)	Reported follow-up period (years)	Long-term event rate		Relative risk reduction (%)	P-value
				Carotid endarterectomy (%)	Medical management (%)		
Symptomatic patients							
NASCET [1]	70–99	5.8	2	9.0 ^a	26.0 ^a	65	<0.001
NASCET [2]	50–69	6.7	5	15.7 ^a	22.2 ^a	29	0.045
ECST [3]	70–99	7.5	3	12.3 ^b	21.9 ^b	45	<0.01
ECST [4,5]	50–69	7.9	8	18.4 ^b	15.6 ^b	None	-
Asymptomatic patients							
ACAS [6]	60–99	2.3	5	5.1 ^a	11.0 ^a	53	0.004
ACST [7]	60–99	3.1	5	6.4 ^c	11.8 ^c	46	<0.0001

^aIncludes 30-day strokes and deaths but only ipsilateral late strokes. ^bIncludes 30-day strokes and deaths and all late strokes. ^cIncludes 30-day strokes (but not deaths) and all late strokes. ACAS, Asymptomatic Carotid Atherosclerosis Study; ACST, Asymptomatic Carotid Surgery Trial; CSM, combined stroke and/or mortality rate; ECST, European Carotid Surgery Trial; NASCET, North American Symptomatic Carotid Endarterectomy Trial; RCT, randomized controlled trial.

^aIncludes 30-day strokes and deaths but only ipsilateral late strokes. ^bIncludes 30-day strokes and deaths and all late strokes. ^cIncludes 30-day strokes (but not deaths) and all late strokes. ACAS, Asymptomatic Carotid Atherosclerosis Study; ACST, Asymptomatic Carotid Surgery Trial; CSM, combined stroke and/or mortality rate; ECST, European Carotid Surgery Trial; NASCET, North American Symptomatic Carotid Endarterectomy Trial; RCT, randomized controlled trial.

Other area of questions:

Women after 2weeks?

Degree of stenosis

Type of plaques?

Post stroke?

Score for prediction? (ABCD 2)

48H CONTORVERSY

WE KNOW DECREASING DELAY BEFORE CEA IS ONE OF DETERMINANT WAY TO DECREASED STROKE, AFTER 2 CANADIAN RETROSPECTIVE TRIAL, CEA WERE PERFORMED WITHIN 2 WEEKS IN LESS THAN 40% OF CASES

-One of real focus should be to focus on operating within 2weeks

SHOULD WE STILL OPERATE WOMEN 50-70% after 2 weeks?????



PROCEDURAL RISK

Look for indication why german operated these guys that early? Just because of crescendo or just because presented fast

Cea plus de stroke post op si opere en 48h

- Risk de transformation (prend 48h a un scan de demontrer une lesion)
- Plaque plus instable?
- Pas le temps de faire pre op adequat

Difference de type de patients:

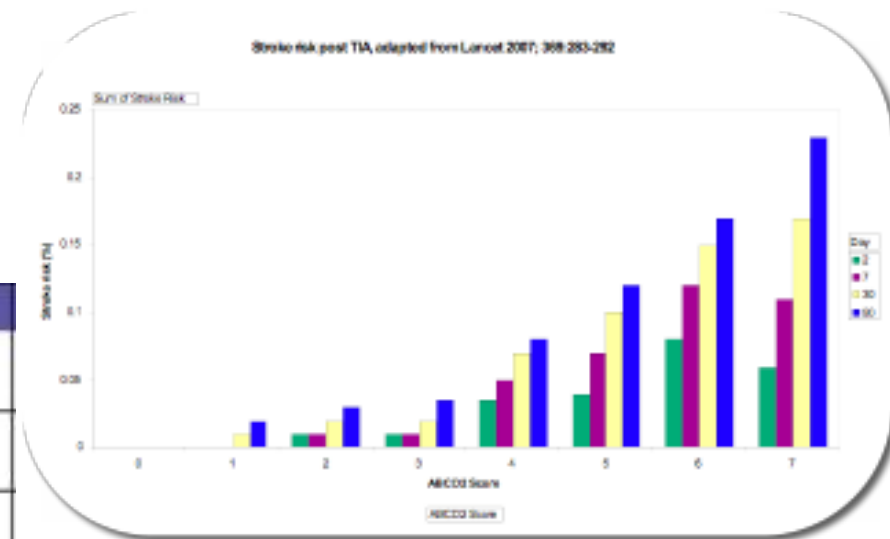
- plus de crescendo
- plus de first event stroke inclus (déjà associé à un risque plus eleve de complic peri-op...)

Oblige a operer weekend when less experience team sometimes and variable quality in post op monitoring

En meme temps: Allemand et UK dans un registre commun de plus 79,000pts demontre pas de differnce significative peri-op

Score ABCD 2

Risk Factor	Points
Age ≥ 60 years	1
Blood pressure Systolic BP ≥ 140 mm Hg OR Diastolic BP ≥ 90 mm Hg	1
Clinical features of TIA (<i>choose one</i>)	
Unilateral weakness with or without speech impairment OR	2
Speech impairment without unilateral weakness	1
Duration	
TIA duration ≥ 60 minutes	2
TIA duration 10-59 minutes	1
Diabetes	1
Total ABCD² score	0-7



ABCD ² Score	2-day Stroke Risk	Comment
0-3	1.0%	Hospital observation may be unnecessary without another indication (e.g., new atrial fibrillation)
4-5	4.1%	Hospital observation justified in most situations
6-7	8.1%	Hospital observation worthwhile

[1] Johnston SC, Rothwell PM, Huyen-Huynh MN, Giles MF, Elkins JS, Sidney S, "Validation and refinement of scores to predict very early stroke risk after transient ischemic attack," *Lancet*. 369:283-292. 2007.

Score ABCD²

Stroke Vasc Neurol. 2017 Mar;17(2):11-15. doi: 10.1136/svn.2017.000273. eCollection 2017 Jun.

ABCD² risk score does not predict the presence of cerebral microemboli in patients with hyper-acute symptomatic critical carotid artery stenosis.

Seedon M¹, Hutchinson CL¹, Incey CL^{1,2}, Singer DC^{1,3,4}

⊕ Author information

Abstract

INTRODUCTION: ABCD² risk score and cerebral microemboli detected by transcranial Doppler (TCD) have been separately shown to predict risk of recurrent acute stroke. We studied whether ABCD² risk score predicts cerebral microemboli in patients with hyper-acute symptomatic carotid artery stenosis.

PARTICIPANTS AND METHODS: We studied 206 patients presenting within 2 weeks of transient ischaemic attack or minor stroke and found to have critical carotid artery stenosis (≥50%). 86 patients (age 70±1 (SEM: years), 59 men, 83 Caucasian) had evidence of microemboli; 72 (84%) of these underwent carotid endarterectomy (CEA). 120 patients (age 72±1 years, 81 men, 113 Caucasian) did not have microemboli detected; 102 (85%) of these underwent CEA. Data were analysed using χ^2 and Mann-Whitney U tests and receiver operating characteristic (ROC) curves.

RESULTS: 140/206 (68%; 95% CI 61.63 to 74.37) patients with hyper-acute symptomatic critical carotid stenosis had an ABCD² risk score ≥4. There was no significant difference in the NICE red flag criterion for early assessment (ABCD² risk score ≥4) for patients with cerebral microemboli versus those without microemboli (59/86 vs 81/120 patients; OR 1.05 ABCD² risk score ≥4 (95% CI 0.58 to 1.90, p=0.867)). The ABCD² risk score was <4 in 27 of 86 (31%; 95% CI 21 to 41) embolising patients and in 39 of 120 (31%; 95% CI 23 to 39) without cerebral microemboli. After adjusting for pre-neurological event antiplatelet treatment (APT), area under the curve (AUC) of ROC for ABCD² risk score showed no prediction of cerebral microemboli (no pre-event APT, n=67: AUC 0.46 (95% CI 0.29 to 0.60, p=0.631); pre-event APT, n=147: AUC 0.51 (95% CI 0.42 to 0.60, p=0.604)).

CONCLUSIONS: The ABCD² score did not predict the presence of cerebral microemboli or carotid disease in over one-quarter of patients with symptomatic critical carotid artery stenosis. On the basis of NICE guidelines (refer early if ABCD² ≥4), assessment of high stroke risk based on ABCD² scoring may lead to inappropriate delay in urgent treatment in many patients.

DELAYED CEA

(J Vasc Surg 2014;60:639-44.)

Preoperative symptom type influences the 30-day perioperative outcomes of carotid endarterectomy and carotid stenting in the Society for Vascular Surgery Vascular Registry

Patrick J. Geraghty, MD,¹ Thomas S. Broderick, MD,² David L. Gillispie, MD,³ Gilbert R. Upchurch, MD,⁴ Michael C. Sinner, MD,⁵ Horea S. Sima, MPH,⁶ Christopher T. Krawiec, MD,⁷ and Philip P. Goodney, MD,⁷ *St. Louis, Mo; Charleston, SC; Salt River and Hixson, Ala; Oronotomah, W; Concord, NC; and Tallahassee, FL*

From the Society for Vascular Surgery

(J Vasc Surg 2017;65:390-7.)

Impact of acute cerebral ischemic lesions and their volume on the revascularization outcome of symptomatic carotid stenosis

Rodolfo Pini, MD, Daniela Faggioli, MD, Matteo Longhi, MD, Ubaldo Forcinto, MD, Andrea Vecchia, MD, Enrico Calista, MD, Mauro Gargiulo, MD, and Andrea Stella, MD, *Bologna, Italy*

(J Vasc Surg 2016;63:1256-61.)

Influence of the type of cerebral infarct and timing of intervention in the early outcomes after carotid endarterectomy for symptomatic stenosis

Georgios Kavadjian, MD,¹ Benjamin Korte, MD,² Richard Lemogus, MD,³ Carlos Alvar Tenaak, MD,⁴ Yusef Eljor, MD, PhD,⁵ and Eric Steinmetz, MD, PhD,⁶ *Duess and Cologne, Austria*



CEA POST THROMBOLYSIS

REVIEW ARTICLES

Richard P. Cambria, MD, Section Editor

Safety of carotid endarterectomy following thrombolysis for acute ischemic stroke

Yao-Pei Yong, MRCSEd,^a John Saunders, MRCSEd,^a Saif Albiel, FRCS,^a Nikola Spragg, FRCP,^b William Vennart, MRCSEd,^a Stuart MacSweeney, FRCS,^a and Nadeem Altam, FRCS,^a Nottingham, United Kingdom

(J Vasc Surg 2013;58:1671-7.)

Int J Vasc Endovasc Surg 2014; 48: 620-625

Editor's Choice - Safety of Carotid Endarterectomy After Intravenous Thrombolysis for Acute Ischaemic Stroke: A Case-Controlled Multicentre Registry Study **CME**

L.R. Rosthøj^{a,b}, M. Moenem^c, T. Thøgers^a, L.R. Jensen^a, R. Miksa^a, C. Wølffgren^d, R. Øst^e, M. Bjørck^f, R. Krøner^{g,h}

^aDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark
^bDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark
^cDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark
^dDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark
^eDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark
^fDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark
^gDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark
^hDepartment of Vascular Surgery, Hvidovre Hospital, University of Copenhagen, Denmark

Int J Vasc Endovasc Surg 2010; 33: 462-466

Very Early Carotid Endarterectomy After Intravenous Thrombolysis

C. Azizi^a, M. Gentile^a, A. De Vito^a, L. Traina^a, E. Sessa^a, C. Fainardi^a, F. Mascioli^a, L. Carotta^{a,b}

^aUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy
^bUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy
^cUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy
^dUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy
^eUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy
^fUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy
^gUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy
^hUnit of Vascular and Neurological Surgery, Department of Vascular and Neurological Surgery, University of Bari, Bari, Italy



Modified Rankin Scale (MRS)

- 0 No symptoms
 - 1 No significant disability, despite symptoms; able to perform all usual duties and activities
 - 2 Slight disability; unable to perform all previous activities but able to look after own affairs without assistance
 - 3 Moderate disability; requires some help, but able to walk without assistance
 - 4 Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
 - 5 Severe disability; bedridden, incontinent, and requires constant nursing care and attention
 - 6 Death
-

Respect 2 weeks?

		Patients (number)	Median (days)	CEA<2weeks
	2010-2011	103	25	39%
	2008-2010	92	79	8%
	2007-2008	100	47	11%
	2008	128	82	7%
	2006	64	47	4,5%
	2002-2006	139	26	21%
	2002-2004	49	100	6%

CEA < 48h

Very Urgent Carotid Endarterectomy Confers Increased Procedural Risk

Sofia Strömberg, MD; Johan Gelin, MD, PhD; Torun Österberg, PhD;
Göran M.L. Bergström, MD, PhD; Lars Karlström, MD, PhD; Klas Österberg, MD, PhD; for the
Swedish Vascular Registry (Swedvasc) Steering Committee

Background and Purpose—Current Swedish guidelines recommend that carotid endarterectomy should be performed within 14 days of a qualifying neurological event, but it is not clear if very urgent surgery after an event is associated with increased perioperative risk. The aim of this study was to determine how the time between the event and carotid endarterectomy affects the procedural risk of mortality and stroke.

Methods—We prospectively analyzed data on all patients who underwent carotid endarterectomies for symptomatic carotid stenosis between May 12, 2008, and May 31, 2011, with records in the Swedish Vascular Registry (Swedvasc). Patients were divided according to time between the qualifying event and surgery (0–2 days, 3–7 days, 8–14 days, 15–180 days). Stroke rate and mortality at 30 days postsurgery were determined.

Results—We analyzed data for 2596 patients and found that the combined mortality and stroke rate for patients treated 0 to 2 days after qualifying event was 11.5% (17 of 148) versus 3.6% (29 of 804), 4.0% (27 of 677), and 5.4% (52 of 967) for the groups treated at 3 to 7 days, 8 to 14 days, and 15 to 180 days, respectively. In a multivariate analysis, time was an independent risk factor for perioperative complications; patients treated at 0 to 2 days had a relative OR of 4.24 (CI, 2.07–8.70; $P < 0.001$) compared with the reference 3- to 7-day group.

Conclusions—In this study of patients treated for symptomatic carotid disease, it was safe to perform surgery as early as Day 3 after a qualifying neurological event in contrast to patients treated within 0 to 2 days, which has a significantly increased perioperative risk. (*Stroke*. 2012;43:1331-1335.)



CEA < 48h

Short Time Interval Between Neurologic Event and Carotid Surgery Is Not Associated With an Increased Procedural Risk

Pavlos Tsantilas, MD*; Andreas Kuchni, MD, MPH*; Thomas König, PhD;
Thorben Breitmeyer; Michael Kallmayer, MD; Christoph Knappich, MD; Sofie Schmid, MD;
Marin Storek, MD, PhD; Alexander Zimmermann, MD, MHBA; Hans-Henning Eckstein, MD, PhD

Background and Purpose: Guidelines recommend that carotid endarterectomy should be performed within 2 weeks in patients with a symptomatic carotid stenosis. Because a Swedish register study indicated that patients treated within the first days after a stroke or transient ischemic attack might have an increased perioperative stroke and mortality risk, this study aimed to find out whether these findings are also true under everyday conditions in Germany.

Methods: Secondary data analysis including 56,336 elective carotid endarterectomy procedures performed for symptomatic carotid stenosis under everyday conditions between 2009 and 2014. The patient cohort was divided into 4 groups according to time interval between index event and surgery (I: 0–2, II: 3–7, III: 8–14, and IV: 14–180 days). Primary outcome was any in-hospital stroke or death. For risk-adjusted analyses, a multilevel multivariable regression model was used.

Results: Mean patients' age was 71.1 ± 9.6 years; 67.5% were men. Overall rate of any stroke or death was 2.5% (n=1434). Risk of any in-hospital stroke or death was 3.0% in group I, 2.5% in group II, 2.6% in group III, and 2.3% in group IV. Multivariable regression analysis revealed that the time interval was not significantly associated with the primary outcome.

Conclusions: The time interval between the index event and carotid endarterectomy was not associated with the risk of any in-hospital stroke or death in patients with symptomatic carotid stenosis in Germany. In clinically stable patients, carotid endarterectomy might, therefore, be performed safely as soon as possible after the neurological index event. (Stroke. 2016;47:2783-2790. DOI: 10.1161/STROKEAHA.116.014058.)



Delays in carotid endarterectomy: the process is the problem.

Blacquiere D¹, Sharma M, Jetty P.

Ⓜ Author information

Abstract

BACKGROUND: Current recommendations for carotid endarterectomy (CEA) for symptomatic carotid stenosis state benefit is greatest when performed within two weeks of symptoms. However, only a minority of cases are operated on within this guideline, and no systematic examinations of reasons for these delays exist.

METHODS: All CEA cases performed at our institution by vascular surgery for symptomatic carotid stenosis after neurologist referral in 2008-2009 were reviewed. Dates of symptom onset, initial presentation, referral to and evaluation by neurology and vascular surgery, vascular imaging, and CEA were collected, and the length of time between each analysed. Reasons for delays were noted where available.

RESULTS: Of 36 included patients, 34 had CEA more than two weeks after symptom onset. Median time to CEA from onset was 76 days (IQR, 38-105 days). Longest intervals were between surgeon assessment and CEA (14 days; IQR, 9-21 days), neurology referral and neurologist assessment (9 days; IQR, 2-26 days), vascular imaging and referral to vascular surgery (9 days; IQR, 2-35 days) and vascular surgery referral and assessment (8 days; IQR, 6-15 days). Few patients (44.1%) had reasons for delays identified; of these, process-related delays were related to delayed vascular imaging, delayed referral by primary care physicians, or multiple conflicting referrals.

CONCLUSIONS: There are significant delays between symptom onset and CEA in patients referred for CEA, with delay highest between specialist referral and evaluation. Strategies to reduce these delays may be effective in increasing the proportion of procedures performed within two weeks of symptom onset.

PMID: 23786745

[Indexed for MEDLINE]

2-5 days safe?

From the Vascular and Endovascular Surgery Society

(J Vasc Surg
2017;66:1719-26.)

Early carotid endarterectomy performed 2 to 5 days after the onset of neurologic symptoms leads to comparable results to carotid endarterectomy performed at later time points

Elviridis G. Angelinos, MD,* Arik Farber, MD,* Adham N. Abou Ali, MD,* Dana Ryland, PhD,* George H. Dorra, PhD,* and Mohammad H. Ezzamel, MD, MPH,* for the Vascular Study Group of New England, Interscience Research Center, Mass.

Journal of Vascular Surgery
Volume 66, Number 6

Zagorinos et al

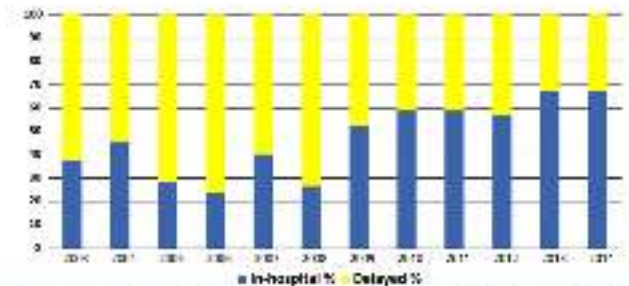


Fig 1. Trend of the ratio of in-hospital to delayed carotid endarterectomy (CEA) between 2005 and 2014.

Sex

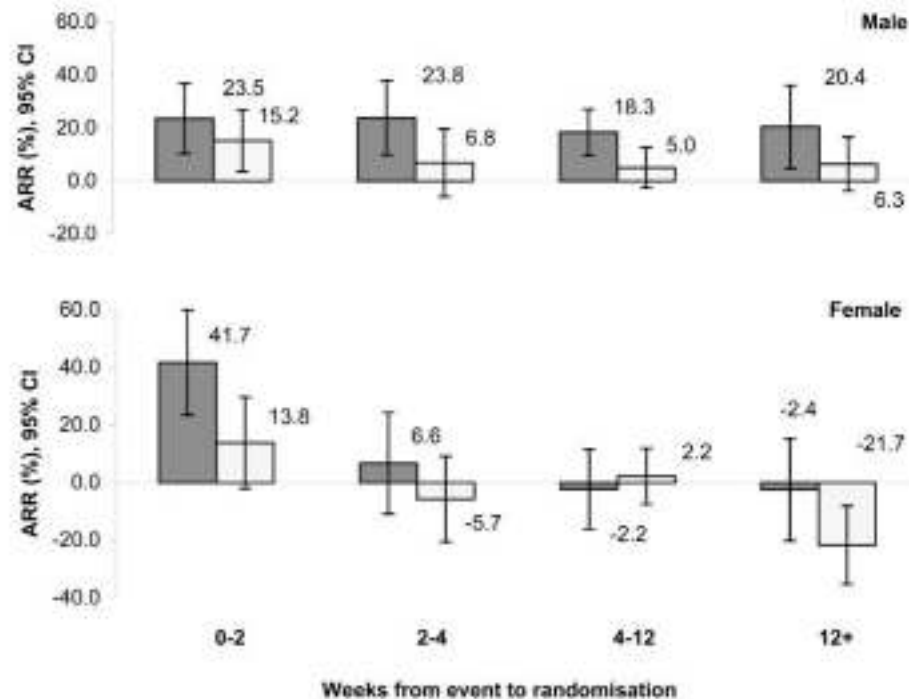
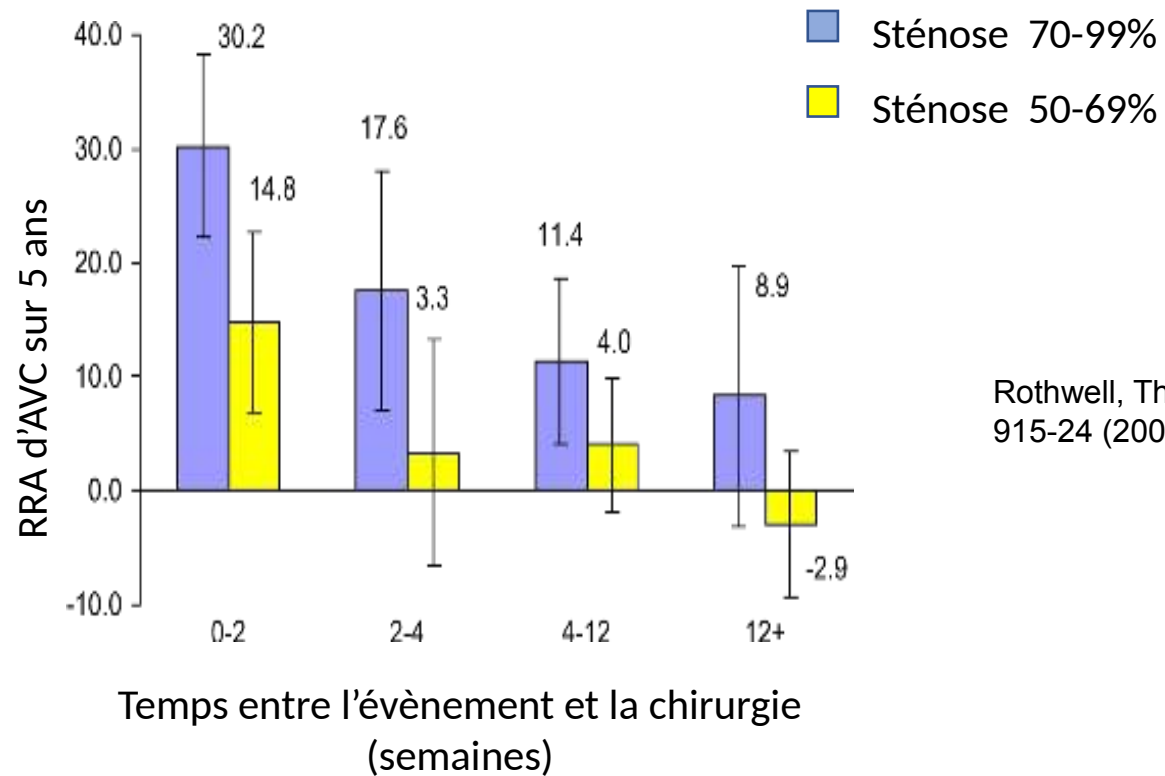


Figure 4. The absolute reduction with surgery in the 5-year risk of each of the 3 main trial outcomes in patients with 50% to 69% stenosis (light bars) and $\geq 70\%$ stenosis without near-occlusion (dark bars) stratified by the time from last symptomatic event to randomization and sex. The numbers adjacent to the bars indicate the exact absolute risk reduction (ARR).

Delay considering stenosis degree

see up to date



Rothwell, The Lancet Vol 363
915-24 (2004)

< 2 semaines (NNT:5) vs >12 semaines (NNT: 125)

From the Society for Vascular Surgery

EVA-3S + SPACE + ICSS

The risk of carotid artery stenting compared with carotid endarterectomy is greatest in patients treated within 7 days of symptoms

Barbara Bannister, MD, PhD,^a Georg Goebel, PhD,^b Leo FL Benati, MD,^c Peter A. Ringleb, MD,^d Jean-Louis Mas, MD,^e and Gerd G. T. Friedrich, MD,^e for the Carotid Stenting Trialists' Collaboration.^a Gendreau, A. K. (2013) *Stroke*, 44(10), 2800-2806.

30-day death/stroke	CAS	CEA	p=
0-7 days	9.4%	2.8%	p=0.03
8-14 days	8.1%	3.4%	p=0.04

J Vasc Surg 2013



NATURAL HISTORY

Table 15. Proportion of patients undergoing CEA in national audits within 0–2, 3–7, 8–14, and ≥15 days after onset of symptoms.

National Audit	0–2 days	3–7 days	8–14 days	≥15 days
Sweden ²¹⁸ <i>n</i> = 2596	148/2596 (6%)	804/2596 (31%)	677/2596 (26%)	967/2596 (37%)
UK ²¹⁹ <i>n</i> = 23,235	780/23,235 (3%)	5126/23,235 (22%)	6292/23,235 (27%)	11,037/23,235 (48%)
Germany ²²⁰ <i>n</i> = 56,279	5198/56,279 (9%)	19,117/56,279 (34%)	16,205/56,279 (29%)	15,759/56,279 (28%)

Table 16. 30-day death/stroke risks after CEA, stratified for delay from symptom onset to CEA in national audits of practice.

National Audit	0–2 days % (95% CI)	3–7 days % (95% CI)	8–14 days % (95% CI)	≥15 days % (95% CI)
Sweden ²¹⁸ <i>n</i> = 2596	17/148 11.5% (6.8–17.8)	29/804 3.6% (2.4–5.1)	27/677 4.0% (2.6–5.8)	52/967 5.4% (4.0–7.0)
UK ²¹⁹ <i>n</i> = 23,235	29/780 3.7% (2.5–5.3)	128/5126 2.5% (2.1–3.0)	132/6292 2.1% (1.8–2.5)	254/11,037 2.3% (2.0–2.6)
Germany ²²⁰ <i>n</i> = 56,279	157/5198 3.0% (2.6–3.5)	480/19,117 2.5% (2.3–2.7)	427/16,205 2.6% (2.4–2.9)	370/15,759 2.3% (2.1–2.6)

NATURAL HISTORY

Table 9. Individual patient meta-analysis of the 5-year risk of any stroke (including the perioperative risk) from pooled ESCT, NASCET, and SVACS Trial data.^a

Stenosis severity (NASCET)	n =	5-year risk of any stroke (inc. perioperative)		ARR @5 years	RRR @5 years	NNT to prevent one stroke @5 years	No. of strokes prevented per 1000 CEAs @5 years
		CEA + BMT	BMT alone				
0–30%	1746	18.4%	15.7%	–2.7%	No benefit	No benefit	None
30–49%	1429	22.8%	25.5%	+2.7%	No benefit	No benefit	27
50–69%	1549	20.0%	27.8%	+7.8%	28%	13	78
70–99%	1095	17.1%	32.7%	+15.6%	48%	6	156
Near occlusion	262	22.4%	22.3%	–0.1%	No benefit	No benefit	None

ARR = Absolute Risk Reduction in stroke; RRR = Relative Risk Reduction in stroke; NNT = number needed to treat to prevent one stroke at 5 years.

^a Data derived from the Carotid Endarterectomy Trialists Collaboration.^{172–174}

CEA < 48h

Eur J Vasc Endovasc Surg (2017) 54, 278–286

Editor's Choice — Very Urgent Carotid Endarterectomy is Associated with an Increased Procedural Risk: The Carotid Alarm Study

A. Nordanstig^{a,b,*}, L. Rosengren^{a,b}, S. Strömberg^c, K. Österberg^c, L. Karlsson^d, G. Bergström^d, Z. Fekete^e, K. Jood^{a,b}

^aDepartment of Clinical Neuroscience, Institute of Neuroscience and Physiology, The Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden

^bDepartment of Neurology, Sahlgrenska University Hospital, Gothenburg, Sweden

^cInstitute of Clinical Science, The Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden

^dThe Sahlgrenska Centre for Cardiovascular and Metabolic Research, Wallenberg Laboratory, Institute of Medicine, The Sahlgrenska Academy at the University of Gothenburg, Gothenburg, Sweden

^eDepartment of Neurology and Rehabilitation, Södra Älvsborg Hospital, Borås, Sweden

Objective/Background: The aim of the Carotid Alarm Study was to compare the procedural risk of carotid endarterectomy (CEA) performed within 48 hours with that after 48 hours to 14 days following an ipsilateral cerebrovascular ischaemic event.

Methods: Consecutive patients with symptomatic carotid stenosis undergoing CEA were prospectively recruited. Time to surgery was calculated as time from the most recent ischaemic event preceding surgery. A neurologist examined patients before and after CEA. The primary endpoint was the composite endpoint of death and/or any stroke within 30 days of the surgical procedure. The study was designed to include 600 patients, with 150 operated on within 48 hours.

Results: From October 2010 to December 2015, 418 patients were included, of whom 75 were operated within 48 hours of an ischaemic event. The study was prematurely terminated owing to the slow recruitment rate in the group operated on within 48 hours. Patients undergoing CEA within 48 hours had a higher risk of reaching the primary endpoint than those operated on later (8.0% vs. 2.9%). Multivariate logistic regression analyses showed that CEA performed within 48 h [odds ratio (OR) 3.07; 95% confidence interval (CI) 1.04–9.09], CEA performed out of office hours (OR 3.65; 95% CI 1.14–11.67), and use of shunt (OR 4.02; 95% CI 1.36–11.93) were all independently associated with an increased risk of reaching the primary endpoint.

Conclusion: CEA performed within 48 hours was associated with a higher risk of complications compared with surgery performed 48 hours–14 days after the most recent ischaemic event.

© 2017 Published by Elsevier Ltd on behalf of European Society for Vascular Surgery.

Respect 2 weeks?

Wait times among patients with symptomatic carotid artery stenosis requiring carotid endarterectomy for stroke prevention

Frank Jany, MD, MSc, FRCSC,¹ Don Hasegawa, BSc, MSc,² Dalibor Kulevik, MD, FRCSC,³ Sudhir Nagpal, MD, FRCSC,⁴ Tim Braxley, MD, FRCSC,⁵ George Hajjar, MD, FRCSC,⁶ Andrew EHL, MD, FRCSC,⁷ and Michael Shorrock, MD, FRCPC,⁸ Ottawa, Ontario, Canada

Structure of Delay in Carotid Surgery -- An Observational Study **CME**

P. Vikatmaa^{a,*}, T. Sairanen^b, J.-M. Lindholm^b, L. Capraro^c, M. Lepäntalo^a, M. Venermo^a

^aDepartment of Vascular Surgery, Helsinki University Central Hospital
^bDepartment of Neurology, Helsinki University Central Hospital
^cDepartment of Anaesthesiology, Helsinki University Central Hospital

Int J Vasc Endovasc Surg. (2017) 54, 415–421

Editor's Choice -- The National Norwegian Carotid Study: Time from Symptom Onset to Surgery is too Long, Resulting in Additional Neurological Events

K.S. Kjekshus^a, S.K. Bakken^a, D. Brundgaard^a, E. Hesthaven^a, T. Hauve-Liung^a, K. Krogh-Sorensen^a, E. Landa^a, S.M. Nannestad^a, G.K. Odegaard^a, R.A. Viddal^a, J. Wesche^a, F. Aasegaard^a, E. Mattsson^a

An institutional study of time delays for symptomatic carotid endarterectomy

Philippe Charbonneau, MD,¹ Paul-Lessard Bonaventura, MD,² Laura M. Druce, MD,³ Nathalie Beaudoin, MD, FRCSC,⁴ Jean-François Blais, MD, FRCSC,⁵ and Stéphanie Elieoui, MD, MSc, FRCSC,⁶ Montreal, Quebec, Canada

Time delay between symptom and surgery in patients with carotid artery stenosis

Jon S. Syberg L, Narreng R, Lindgren A. Time delay between symptom and surgery in patients with carotid artery stenosis. J Vasc Med Biol. 2017;29(1):1-6. DOI: 10.1177/104940211664406201601476

S. Andgren¹

Delay from symptoms to carotid endarterectomy

■ E. P. Johansson & P. Wester

From the Department of Public Health and Clinical Medicine, Umeå Stroke Centre, Norrlands University Hospital, Umeå, Sweden

NATURAL HISTORY

RISK OF STROKE AFTER TIA

	48 h	2 weeks	5 years
ECST+NASCET+VA, BMT patients			21%
Johansson <i>et al.</i>	5%	11%	
Marmane <i>et al.</i>	5%	16%	
Bonifati <i>et al.</i>	8%		
Fairhead <i>et al.</i>		20%	
Ois <i>et al.</i>		25%	

*Risk of stroke after TIA in patients with 50-99% carotid stenoses



CEA < 48h

NATIONAL AUDIT

	Nb of patients CEA < 48h	30d death/stroke after CEA
Sweden (n=2596)	148	11.5% (6.8 – 17.8)
UK (n=23,235)	780	3.7% (2.5 – 5.3)
Germany (n=56,279)	5198	3.0% (2.6 – 3.5)



Time to onset to CEA

≤48h

3-7days

8-14 days

> 15

Sweden

(n=2596)

11.5%
(17/148 pts)

3.6%

4.0%

5.1%

META-ANALYSIS

2008-2015

De Rango et al.

5.3%

3.3%

3.4%

2.1%

UK

(n=23,235)

3.7%
(29/780 pts)

2.5%

2.1%

2.1%

Germany

(n=56,279)

3.0%
(157/5198 pts)

2.5%

2.6%

2.1%



Proportion CEA performed $\leq$ 2 weeks

	2014-2015	62%
	2009-2014	72%
	2009-2013	52%
	2008-2011	63%

	2014-2015	62%
	2009-2014	72%
	2009-2013	52%
	2008-2011	63%



PREDICTIVE FACTORS OF STROKE

AFTER TIA

Table 10. Clinical and imaging features that were predictive of a significant increase in late stroke in patients with 50–99% stenoses randomised within ECST and NASCET.

Clinical features	Imaging features
Increasing age ^{172,173,176} 5 y ARR in ipsilateral stroke conferred by CEA <65 y = 5.6%; 65–75 y = 8.6%; >75 y = 19.2%	Irregular vs. smooth plaques ¹⁷³ 5 y ARR in ipsilateral stroke conferred by CEA smooth = 8%; irregular = 17%
Recency of symptoms ¹⁷³ 5 y ARR in ipsilateral stroke conferred by CEA <2 wks = 18.5%; 2–4 wks = 9.8%; 4–12 wks = 5.5%; >12 wks = 0.8%	Increasing stenosis severity ¹⁷² 5 y ARR in ipsilateral stroke conferred by CEA 50–69% = 4%; 60–69% = 5.9%; 70–79% = 15.8%; 80–99% = 17.7%; 90–99% = 32.4%; near-occlusion = 0.1%
Males vs. females ¹⁷⁴ 5 y ARR in ipsilateral stroke conferred by CEA males = 11%; females = 2.8%	Contralateral occlusion ¹⁷³ 5 y ARR in ipsilateral stroke conferred by CEA Contralateral occlusion = 24%; no occlusion = 13%
Hemispheric vs. ocular symptoms ¹⁷³ 5 y ARR in ipsilateral stroke conferred by CEA ocular = 5%; TIA = 15%; stroke = 18%	Tandem intracranial disease ¹⁷⁸ 3 y risk of ipsilateral stroke in medically treated patients with tandem intracranial disease increased with extracranial ICA stenosis severity 50–69% = 19%; 70–84% = 29%; 85–99% = 45%
Cortical vs. lacunar stroke ¹⁷⁷ 3 y ARR in ipsilateral stroke conferred by CEA non-lacunar stroke = 15%; lacunar stroke = 9%	No recruitment of collaterals ¹⁷⁹ 2 y ARR in ipsilateral stroke conferred by CEA collaterals recruited = 5%; no recruitment = 19%
Increasing medical comorbidities ¹⁸ 2 y risk of ipsilateral stroke on BMT 0–5 comorbidities = 17%; 6 = 23%; 7+ = 39%	
2 y risk of ipsilateral stroke with CEA 0–5 comorbidities = 11%; 6 = 6%; 7+ = 8%	

y = year(s).



PREDICTIVE FACTORS OF STROKE

AFTER TIA

Clinical features	5 yrs ARR stroke conferred by CEA
Age	<65yo: 5.6% 65-75yo: 8.6% >75yo: 19.2%
Recency of Sx	<2weeks: 18.5% 2-4weeks: 9.8% 4-12weeks: 5.5% >12weeks: 0.8%
Sex	F: 2.8% M: 11%
Types of Sx	AF: 5% TIA: 15% Stroke: 18%
Cortical vs lacunar	Lacunar: 9% Cortical: 15% (3yrs ARR)
Comorbidities	Risk of stroke at 2yrs on BMT 0-5 comorbidities: 17% 6: 23% 7+ : 39% Risk of stroke at 2yrs with CEA: 0-5: 11% 6: 6% 7+ : 8%

Imaging features	5 yrs ARR ipsilateral stroke conferred by CEA
Type of plaques	Smooth: 8% Irregular: 17%
Stenosis degree	50-69%: 4% 60-69%: 5.9% 70-79%: 15.8% 80-99%: 32.4% Near occlusion: 0.1%
Contralateral occlusion	No occlusion: 13% Contralateral occlusion: 24%
Tandem intracranial disease	Combinaison with degree of EC ICA stenosis: 50-69%: 19% 70-84%: 29% 85-99%: 45% (3yrs ARR)
Collaterals recruitment	Recruited: 5% Not recruited: 19% (2yrs ARR)



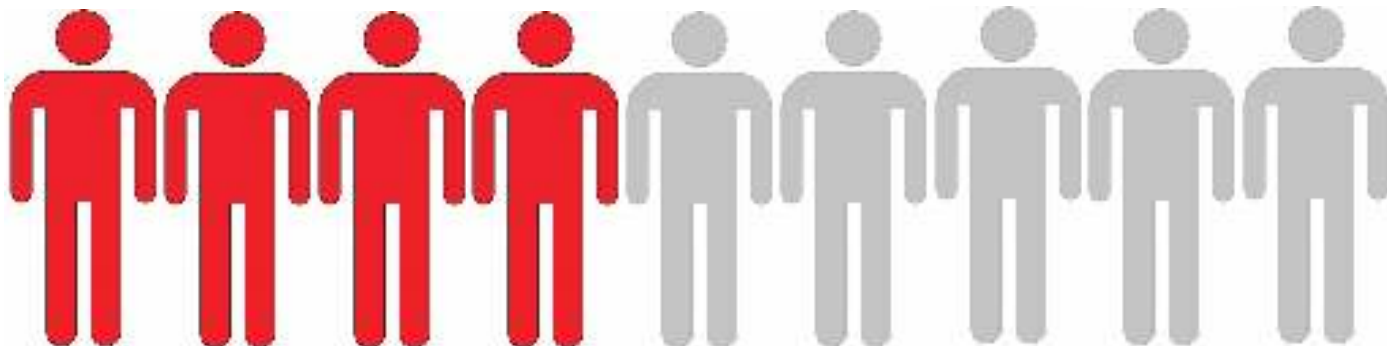
STÉNOSE CAROTIDIENNE

- 10-15% de tous les AVC
- 2.4% de la population ont une sténose carotidienne
- Risque annuel d'AVC associé: 2%

Naylor AR et al., *The Surgeon*
Rothwell PM et al., *Neurology*
2005;64:817-20

OBJECTIF THÉRAPEUTIQUE

- A) **IDENTIFIER** ces 2400 patients annuellement
- B) **PRÉVENIR** ces AVC



Symptomatique: 1000 pts

Asymptomatique: 1400 pts

INDICATIONS THÉRAPEUTIQUES

SYMPTOMATIQUE

ASYMPTOMATIQUE



INDICATIONS THÉRAPEUTIQUES

SYMPTOMATIQUE

ASYMPTOMATIQUE



Tous (IA)



INDICATIONS THÉRAPEUTIQUES

	SYMPTOMATIQUE	ASYMPTOMATIQUE
	Tous (IA)	
	Sténose 70-99% (IA)	
		

INDICATIONS THÉRAPEUTIQUES

	SYMPTOMATIQUE	ASYMPTOMATIQUE
	Tous (IA)	
	Sténose 70-99% (IA) Sténose 50-69% (IIa)	
		

INDICATIONS THÉRAPEUTIQUES

	SYMPTOMATIQUE	ASYMPTOMATIQUE
	Tous (IA)	
	Sténose 70-99% (IA) Sténose 50-69% (IIa)	
	Sténose 50-99% (IIb)	

INDICATIONS THÉRAPEUTIQUES

	SYMPTOMATIQUE	ASYMPTOMATIQUE
	Tous (IA)	Tous (IA)
	Sténose 70-99% (IA) Sténose 50-69% (IIa)	
	Sténose 50-99% (IIb)	

INDICATIONS THÉRAPEUTIQUES

	SYMPTOMATIQUE	ASYMPTOMATIQUE
	Tous (IA)	Tous (IA)
	Sténose 70-99% (IA)	
	Sténose 50-69% (IIa)	Sténose 60-99% (IIa)
	Sténose 50-99% (IIb)	

INDICATIONS THÉRAPEUTIQUES

	SYMPTOMATIQUE	ASYMPTOMATIQUE
	Tous (IA)	Tous (IA)
	Sténose 70-99% (IA)	
	Sténose 50-69% (IIa)	Sténose 60-99% (IIa)
	Sténose 50-99% (IIb)	Sténose 60-99% (IIb)