Evolution fonctionnelle à 1 an du traitement de l'anévrisme intracrânien rompu chez le sujet ≥ 70 ans. Essai prospectif – Sous groupe randomisé Essai clinique FASHE - 2007/042/HP

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SECTION VASCULAIRE SFNC

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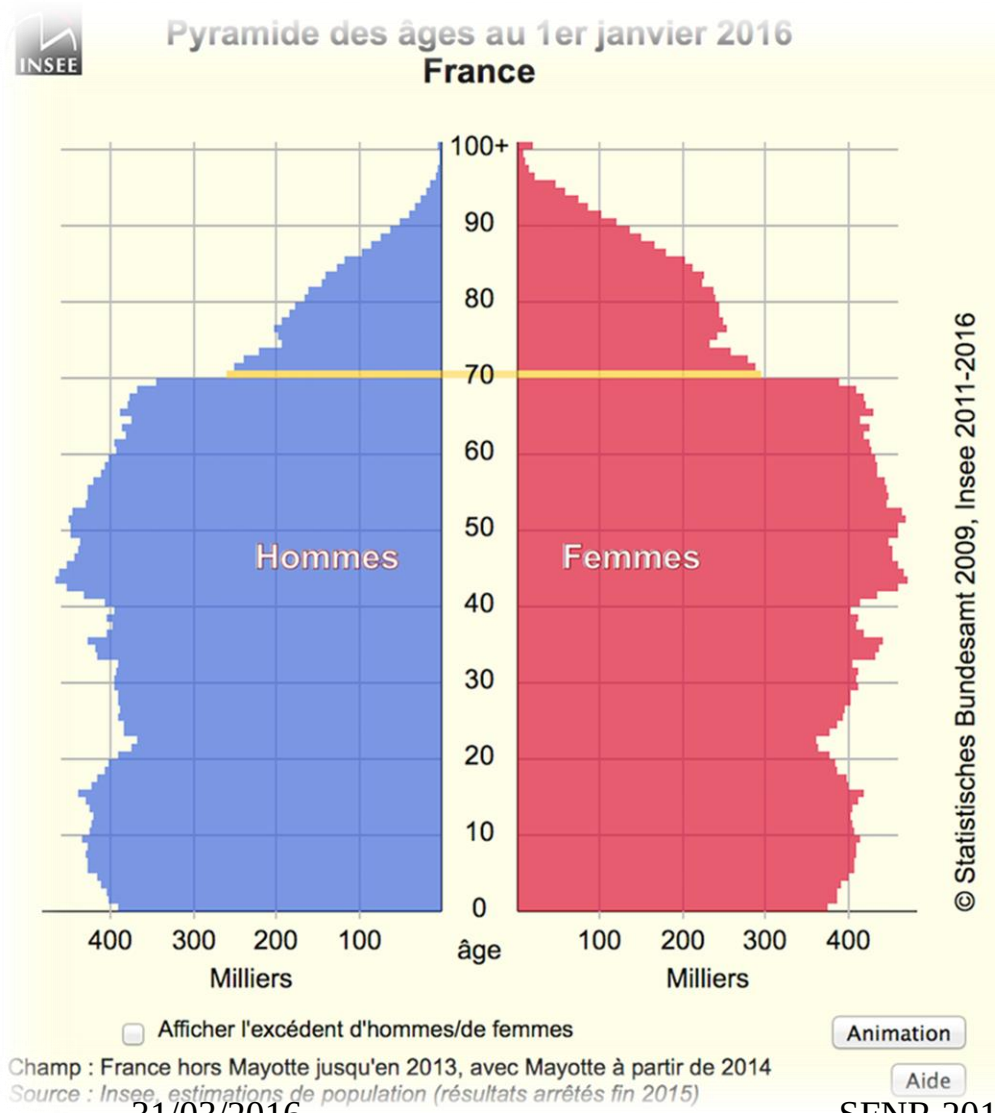
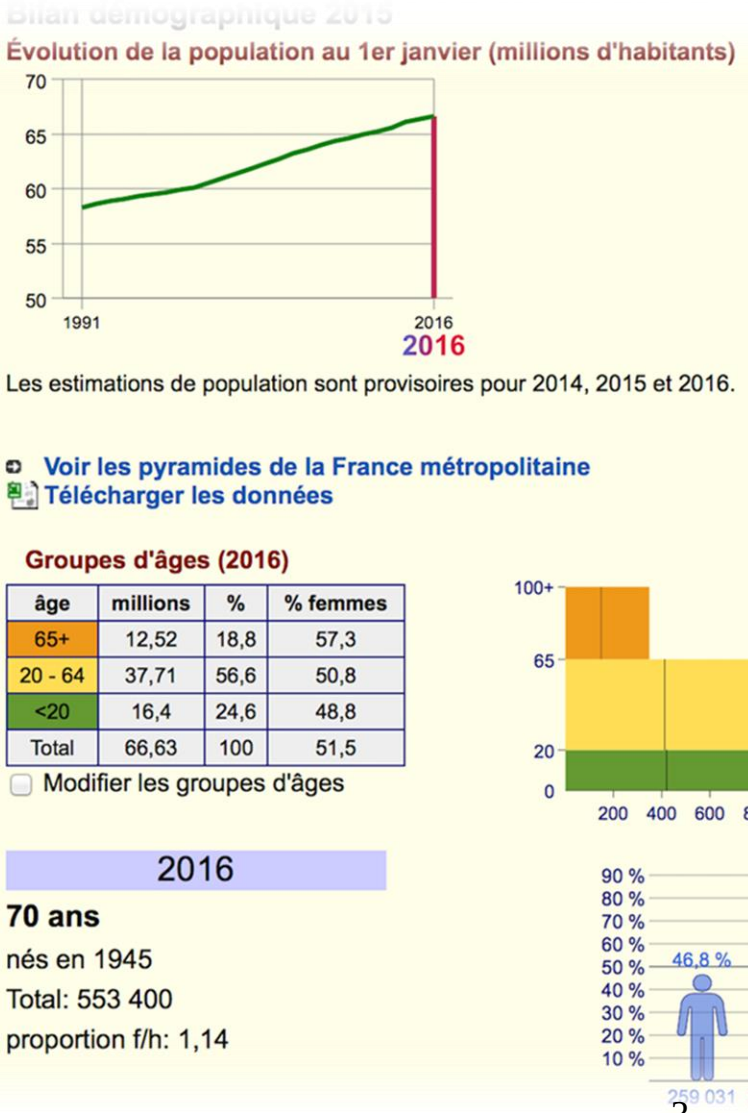
Conflit d'intérêt
B Braun (acceuil de la section)

REMERCIEMENTS
à la
SFNR

Introduction





CLINICAL STUDIES

Surgical Treatment for Aneurysmal Subarachnoid Hemorrhage in the 8th and 9th Decades of Life

Endovascular Treatment of Intracranial Aneurysms in Elderly Patients
A Systematic Review and Meta-Analysis

Carmelo L. Sturiale, MD; Waleed Brinjikji, MD; Mohammad H. Murad, MD, MPH;

Outcome			0.645[c]
Favorable (GR, MD)	239 (53.2)	45 (50.6)	
Unfavorable (SD, VS, D)	210 (46.8)	44 (49.4)	

[a] H&K, Hunt and Kosnik grade; ICA, internal carotid artery; ACA, anterior cerebral artery; MCA, middle cerebral artery; VBA, vertebrobasilar artery; GR, good

Table 4. Long-term Clinical and Angiographic Follow-up

	All Patients		Ruptured Patients	
Outcomes	No. Studies	% Outcome (95% CI)	No. Studies	% Outcome (95% CI)
Good recovery				
6 mo to 12 mo	6	40.0 (33.0–47.0)	5	33.0 (25.0–41.0)
>12 mo	5	67.0 (49.0–82.0)	5	58.0 (47.0–68.0)
Good recovery+moderate disability				
6 mo to 12 mo	9	60.0 (50.0–69.0)	8	56.0 (44.0–67.0)
>12 mo	8	78.0 (66.0–87.0)	7	66.0 (59.0–72.0)
Severe disability				
6 mo to 12 mo	9	24.0 (17.0–32.0)	8	26.0 (18.0–35.0)
>12 mo	8	18.0 (11.0–30.0)	7	22.0 (14.0–34.0)

Endovascular Coiling of Intracranial Aneurysms in Elderly Patients: Report of 205 Treated Aneurysms

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BACKGROUND: More elderly patients are presenting with intracranial aneurysms. Many are poor surgical candidates and often undergo endovascular treatment.
OBJECTIVE: We present our experience with embolization in elderly patients.
METHODS: We performed a retrospective review of a prospective database of elderly patients treated with coil embolization for intracranial aneurysms.

TABLE 10. Reported Findings in Elderly Patients[a]

	Series				
	Ryttlefors et al,[17] 2008 (ISAT Subgroup)	Lubicz et al,[18] 2004	Cal et al,[19] 2005	Sedat et al,[20] 2002	Current Study
No. of patients	138	68	63	52	196
Ruptured or unruptured	R	R	R + U	R	R + U
Neurologic deterioration	11.4%	2.9%	9%	4.2%	8%
Reruptures	Not reported for elderly (3% in general)	0	3%	0	1.6%
Retreatment	17.4%	7.3%	17%	5.7%	13%

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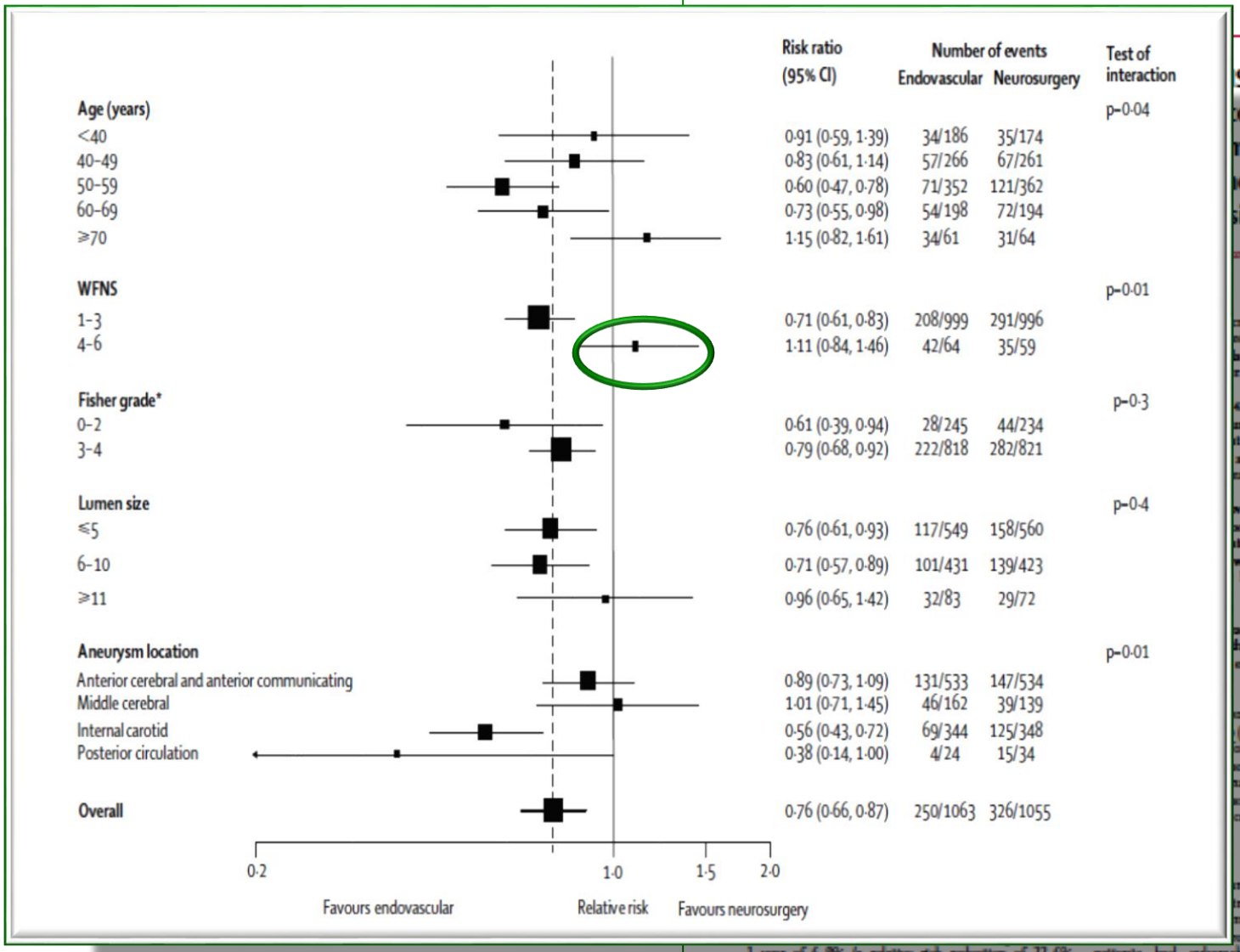
I year between 1950 and 2005, increasing from 12 million to 37 million, and it is expected to continue expanding at a more rapid rate than the general population until 2050.[1] As this population expands, we can expect more elderly patients to present with intracranial aneurysms. The elderly, along with women, are already one of the largest demographics in patients presenting with subarachnoid hemorrhage (SAH), and

ABBREVIATIONS: ISAT, International Subarachnoid Aneurysm Trial; MCA, middle cerebral artery; mRS, modified Rankin Scale; SAH, subarachnoid hemorrhage

come.[2,3] Older age, combined with a higher frequency of comorbidities, makes many of these patients poor surgical candidates. Medical complications that can occur with anesthetic and surgical treatment can lead to worse outcomes in patients harboring both ruptured and unruptured aneurysms. Endovascular coil embolization represents a generally better-tolerated alternative than surgical clipping.[4,5]

In long-term follow-up of patients treated in the International Subarachnoid Aneurysm Trial (ISAT), younger patients (<60 years of age) treated by coil embolization, despite good initial results, had a greater risk for late rebleeding compared


Risk ratio (95% CI)
Number of events
Endovascular
Neurosurgery
Test of interaction
Age (years)
p=0·04
<40
0·91 (0·59, 1·39)
34/186
35/174
40–49
0·83 (0·61, 1·14)
57/266
67/261
50–59
0·60 (0·47, 0·78)
71/352
121/362
60–69
0·73 (0·55, 0·98)
54/198
72/194
⩾70
1·15 (0·82, 1·61)
34/61
31/64
WFNS
p=0·01
1–3
0·71 (0·61, 0·83)
208/999
291/996
4–6
1·11 (0·84, 1·46)
42/64
35/59
Fisher grade*
p=0·3
0–2
0·61 (0·39, 0·94)
28/245
44/234
3–4
0·79 (0·68, 0·92)
222/818
282/821
Lumen size
p=0·4
⩽5
0·76 (0·61, 0·93)
117/549
158/560
6–10
0·71 (0·57, 0·89)
101/431
139/423
⩾11
0·96 (0·65, 1·42)
32/83
29/72
Aneurysm location
p=0·01
Anterior cerebral and anterior communicating
0·89 (0·73, 1·09)
131/533
147/534
Middle cerebral
1·01 (0·71, 1·45)
46/162
39/139
Internal carotid
0·56 (0·43, 0·72)
69/344
125/348
Posterior circulation
0·38 (0·14, 1·00)
4/24
15/34
Overall
0·76 (0·66, 0·87)
250/1063
326/1055
0·2
1·0
1·5
2·0
Favours endovascular
Relative risk
Favours neurosurgery

International Subarachnoid Aneurysm Trial of Neurosurgical Clipping Versus Endovascular Coiling

Subgroup Analysis of 278 Elderly Patients

Mats Ryttlefors, MD; Per Enblad, MD, PhD; Richard S.C. Kerr, MD; Andrew J. Molyneux, MD

Background and Purpose—It is often thought that elderly patients in particular would benefit from endovascular aneurysm treatment. The aim of this analysis was therefore to compare the efficacy and safety of endovascular coiling (EVT) with neurosurgical clipping (NST) in the subgroup of elderly SAH patients in the International Subarachnoid Aneurysm Trial (ISAT).

Methods—In the ISAT cohort 278 SAH patients, 65 years or older, were enrolled. The patients were randomly allocated EVT (n=138) or NST (n=140). The primary outcome was the proportion of patients with a modified Rankin scale score of 0 to 2 (independent survival) at 1 year after the SAH. The rates of procedural complications and adverse events were also recorded.

Results—83 of 138 (60.1%) patients allocated EVT were independent compared to 78 of 140 (56.1%) allocated NST (N.S.). 36 of 50 (72.0%) patients with internal carotid and posterior communicating artery aneurysms allocated EVT were independent compared to 26 of 50 (52.0%) allocated NST ($P<0.05$). 10 of 22 (45.5%) patients with middle cerebral artery aneurysms allocated EVT were independent compared to 13 of 15 (86.7%) allocated NST ($P<0.05$). The epilepsy frequency was 0.7% in the EVT group compared to 12.9% in the NST group ($P<0.001$).

Conclusions—In good grade elderly SAH patients with small anterior circulation aneurysms, EVT should probably be the favored treatment for ruptured internal carotid and posterior communicating artery aneurysms, whereas elderly patients with ruptured middle cerebral artery aneurysms appear to benefit from NST. EVT resulted in a lower epilepsy frequency than NST. (***Stroke*. 2008;39:2720-2726.)**

Key Words: subarachnoid hemorrhage ■ intracranial aneurysm ■ aged ■ endovascular treatment ■ neurosurgery ■ clinical trial

International Subarachnoid Aneurysm Trial of Neurosurgical Clipping Versus Endovascular Coiling

Subgroup Analysis of 278 Elderly Patients

Mats Ryttlefors, MD; Per Enblad, MD, PhD; Richard S.C. Kerr, MD; Andrew J. Molyneux, MD

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■ clinical trial

nage younger patients do. Reasons for this are less active manage-
tion ment and conservative referral patterns,[10,11] poorer clinical
cies grades on admission,[12–14] and a higher frequency of comor-
erly bidity,[8,15] and that patients over 50 years of age tolerate
The craniotomy and clipping of intracranial aneurysms less well.
g 78 Changes in referral patterns and more active management
per have improved outcome over time in elderly SAH patients.[16]
nce, In 1990 the detachable platinum coil[17,18] was introduced
ents for obliterating ruptured aneurysms. Since 1995 endovascular
ment treatment (EVT) has been widely used in patients with
e in ruptured and unruptured aneurysms.[19,20] With the prospect of
d in reducing the risk of rebleeding without the need for craniot-
ents omy, thus reducing surgical trauma, EVT was conceived as a
ured promising alternative to neurosurgical treatment (NST), es-
t is pecially in elderly and poor-grade patients. Some studies
ided focusing on EVT of ruptured aneurysms specifically in
erly elderly patients have shown favorable results.[21–26] However,
SAH patients have a greater risk of poor outcomes[8,9] than the benefit of EVT versus conventional NST specifically in

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Objectif primaire

Différence de handicap fonctionnel à 1 an chez des patients de 70 ans et plus en comparant exclusion microchirurgicale et occlusion endovasculaire de l'anévrisme rompu ?

Critère de jugement principal

- Principal

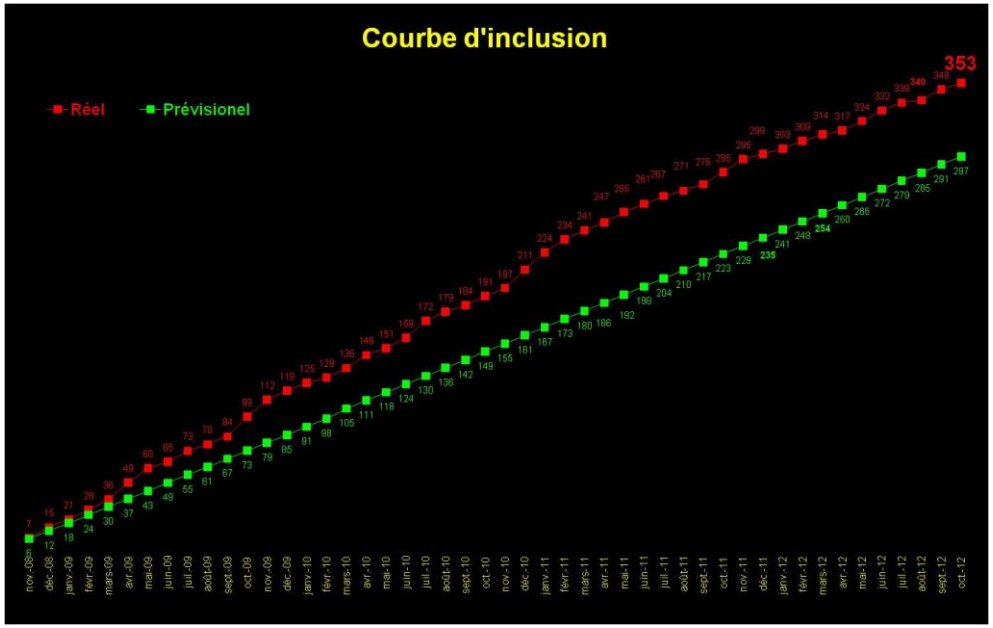
  Proportion de patients ayant une évolution défavorable [mRS > 2] à 12 mois. Echelle de Rankin modifiée à 7 grades

Grade	Critère
Grade 0	Aucun symptôme.
Grade 1	Symptôme mineur, capable de reprendre toutes les activités de la vie quotidienne sans assistance. Note : cela ne tient pas compte de la fatigabilité, la perte de sensibilité, le trouble du langage, etc.… puisque ces troubles lorsqu'ils sont modérés ne modifient pas leur activité.
Grade 2	Restrictions mineures dans la qualité de vie, incapable de réaliser toute l'activité antérieure mais capable d'assurer toutes les tâches quotidiennes sans assistance à domicile comme à l'extérieur. Une aide de supervision n'est pas nécessaire.
Grade 3	Restrictions majeures dans la qualité de vie, nécessite une aide quotidienne dans les tâches ménagères, dans l'hygiène, l'habillement. Ne peut lire et communiquer facilement. Une supervision quotidienne est nécessaire.
Grade 4	Handicap modéré à majeur, incapable de marcher sans assistance, les besoins corporels élémentaires nécessitent une aide. La supervision est indispensable 24h/24h. Mais le patient conserve quelques activités propres sans ou avec une assistance minime.
Grade 5	Handicap majeur, incontinence imposant un nursing constant et soins médicaux quotidiens.
Grade 6	Décès

Objectifs secondaires

- **A 1 an:**
  - **Statut cognitif (MMSE)**
  - **Niveau de dépendance (IADL)**
  - **Qualité de vie (score EORTC)**
  - **Causes de morbidité/mortalité à la sortie.**

Travail multidisciplinaire



(61) Lille

(38) Rouen

(16) Caen

(23) Nancy

(34) Rennes

(14) KB/Paris

(4) Besançon

(27) Dijon

(12) Clermont

(25) Poitiers

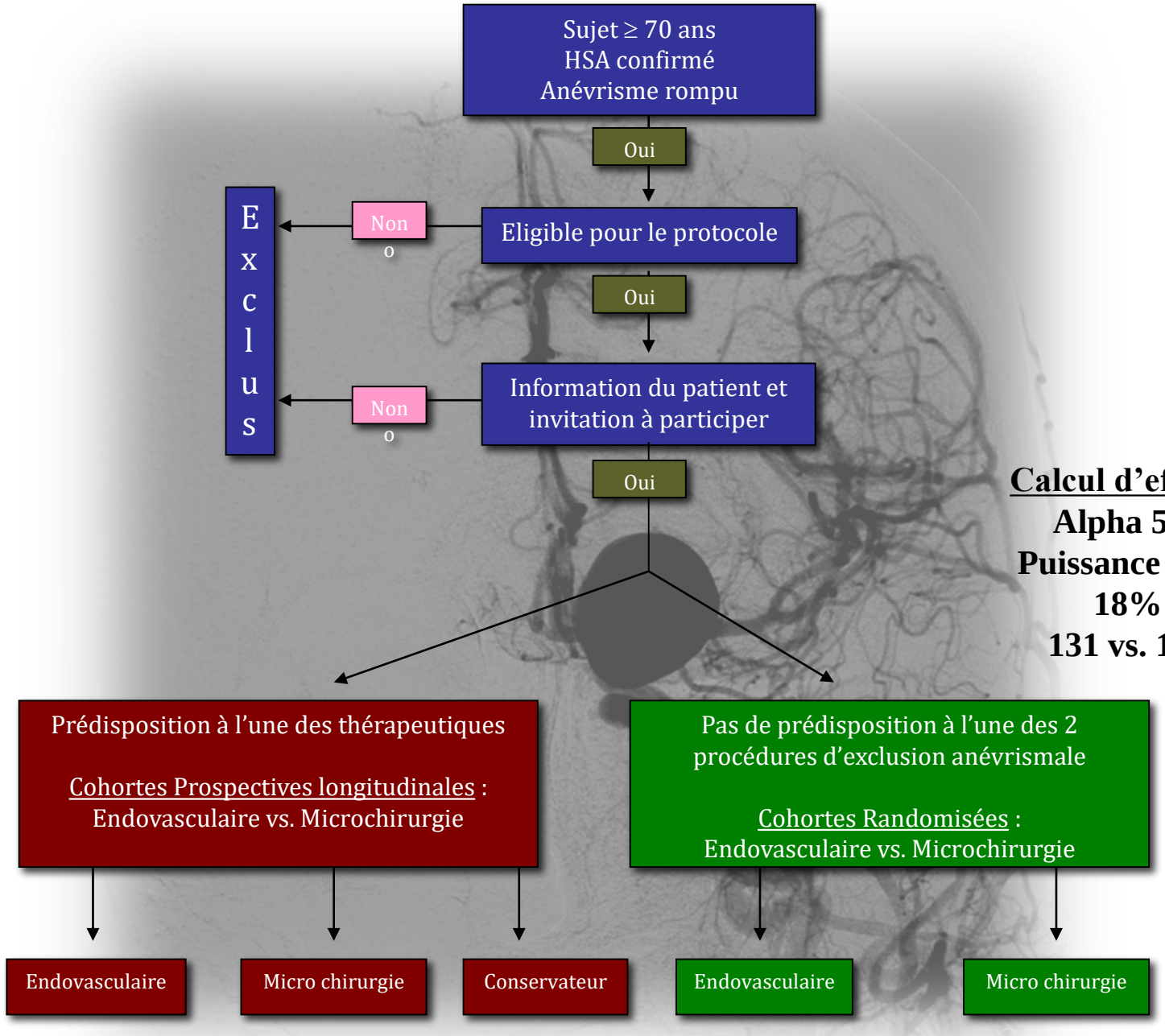
(50) Bordeaux

(3) Toulouse

(1) Marseille

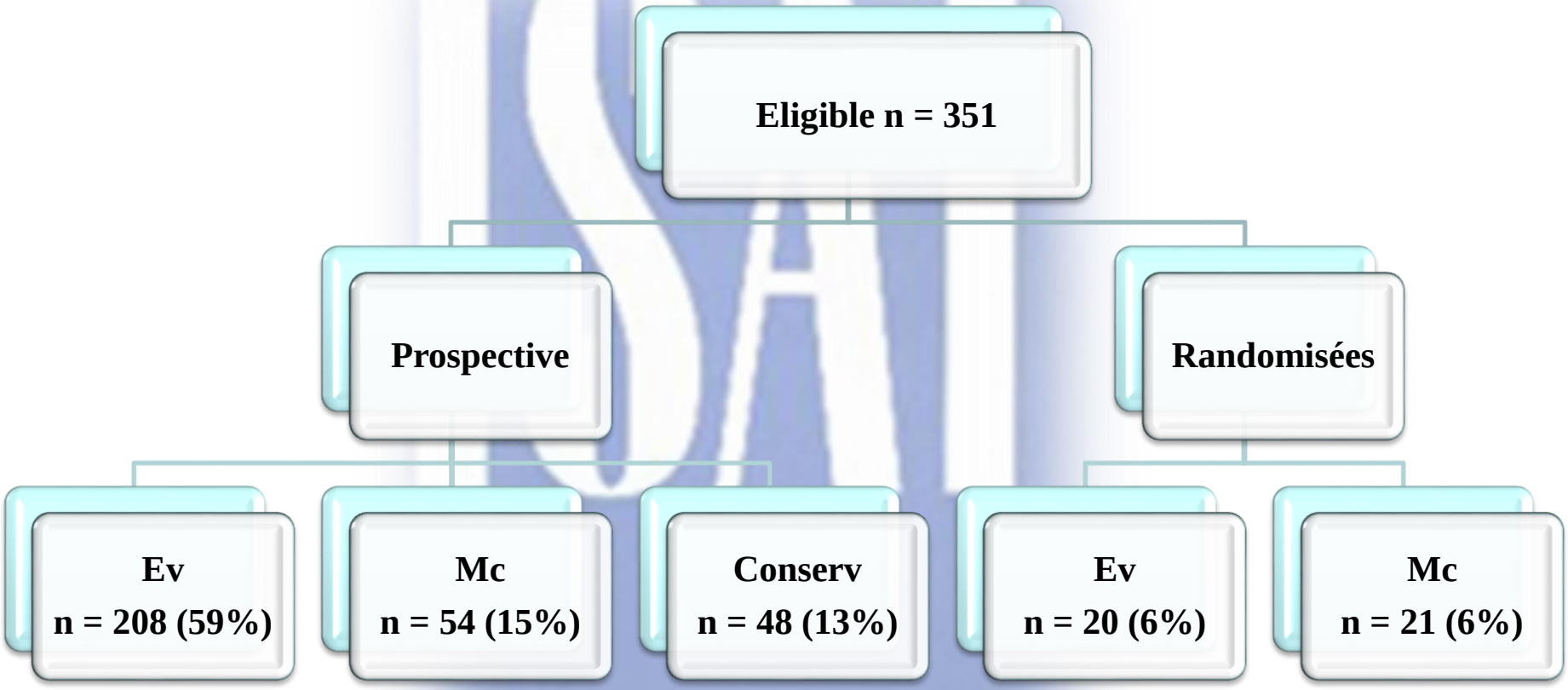
(28) Nice

Délai inclusion: 1.8 ± 0.25 days

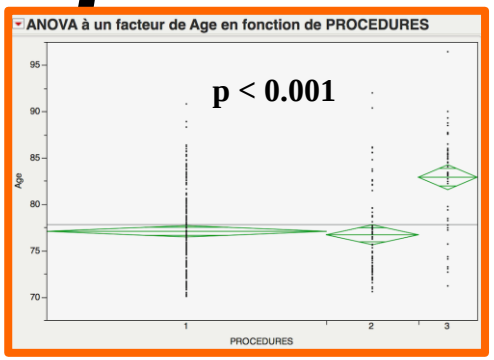


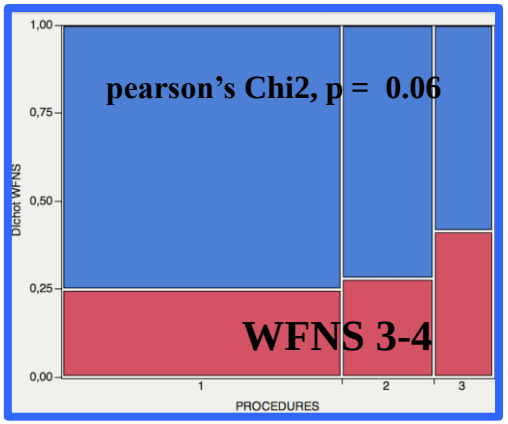
Calcul d'effectif
Alpha 5%
Puissance 80%
18%
131 vs. 131

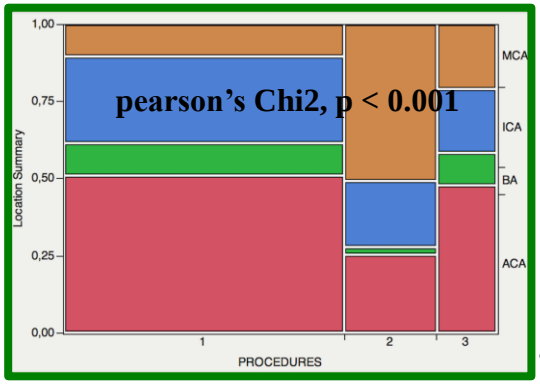
Flow-chart


Eligible n = 351
Prospective
Randomisées
Ev
n = 208 (59%)
Mc
n = 54 (15%)
Conserv
n = 48 (13%)
Ev
n = 20 (6%)
Mc
n = 21 (6%)

Population







Variables	Endovascular n = 228 (65%) [95% IC]	Microsurgical n = 75 (29.3%) [95% IC]	Conservative n = 48 (13.7%) [95% IC]	Total n = 351 (%) [95% IC]
Age	77.1 ± 4.6 [76.5-77.7]	76.7 ± 4.8 [75.6-77.8]	82.9 ± 5.3 [81.4-84.5]	77.8 ± 5.1 [77.2-78.3]
Sex ratio F/H	4.2 (184/44)	5.3 (63/12)	7 (42/6)	4.6 (289/62)
Educational level				
Primary school	72 (31.6)	27 (36)	24 (50)	123 (35)
Secondary school	74 (32.5)	26 (34.7)	17 (35.4)	117 (33.3)
Training	24 (10.5)	15 (20)	2 (4.2)	41 (11.7)
University	28 (12.3)	5 (6.7)	1 (2.1)	34 (9.7)
NA	30 (13.2)	2 (2.7)	4 (8.4)	36 (10.2)
Carlson score (comorbidity)	4 ± 1.4 [3.8-4.1]	3.7 ± 1.3 [3.5-4]	4.5 ± 1.2 [4.1-4.9]*	4 ± 1.4 [3.9-4.2]
Vascular risk factors				
Smoking 1	157 (68)	62 (82.7)	37 (77.1)	256 (72)
Smoking 2/3	57 (25)/14 (6.2)	10 (13.3)/3 (4)	10 (20.8)/1 (2.1)	77 (22)/18 (6)
TC > 5 mmol/l	57 (25)	15 (20)	13 (27.1)	85 (24.3)
HT, dias > 90 mmHg	79 (34.7)	43 (57.3)	27 (56.3)	149 (42.5)
Alcohol, > 3 glass/d.	6 (2.6)	2 (2.7)	0 (0)	8 (2.3)
WFNS classification				
WFNS 1 (GCS 15)	106 (46.5)	29 (38.7)	12 (25)	147 (41.9)
WFNS 2 (GCS 13-14)	65 (28.5)	25 (33.3)	16 (33.3)	106 (30.2)
WFNS 3 (deficit)	16 (7)	9 (12)	5 (10.4)	30 (8.5)
WFNS 4 (GCS 7-12)	41 (18)	12 (16)	15 (31.3)	68 (19.4)
SAH on CT scan				
Fisher 0	3 (1.3)	1 (1.3)	1 (2)	5 (1.4)
Fisher 1	21 (9.2)	3 (4)	3 (6.2)	27 (7.7)
Fisher 2	55 (24.1)	12 (16)	6 (12.5)	73 (20.8)
Fisher 3	106 (46.5)	39 (52)	27 (56.5)	172 (49)
Fisher 4	43 (18.9)	20 (26.7)	11 (22.9)	74 (21.1)
Ruptured IA location §				
ACA	116 (50.8)	19 (25.3)	23 (47.9)	157 (44.7)
MCA	24 (10.5)	38 (50.7)	10 (20.8)	72 (20.5)
ICA	64 (28.1)	16 (21.3)	10 (20.8)	87 (24.8)
BA	24 (10.5)	2 (2.7)	5 (13.6)	35 (9.9)
Ruptured IA size				
Diameter	7.2 ± 6.4 [6.4-8]	6.5 ± 4.9 [5.4-7.7]	7.6 ± 6.3 [5.7-9.4]	7.1 ± 6.1 [6.4-7.8]
Neck ≤ 4 mm	168 (74.7)	56 (74.7)	29 (60.4)	253 (72.3)
Multiple IA	41 (18.5)	10 (13.5)	5 (10.6)	56 (16.4)

Table 3. Independent (mRS 0-2) elderly patients (≥ 70 years old) with ruptured IA (n = 351), according to the therapeutic proposition.

Therapeutic procedures	1. Discharge (%)	2 months (%)	6 months (%)	2. 12 months (%)
Endovascular (n = 228)	81 (35.5)	112 (52.8)	121 (59.6)	122 (61)
Microsurgical (n = 74)	28 (37.8)	35 (50)	31 (49.2)	31 (49.1)
Conservative (n = 48)	4 (8.3)	4 (8.7)	3 (6.8)	5 (10.8)

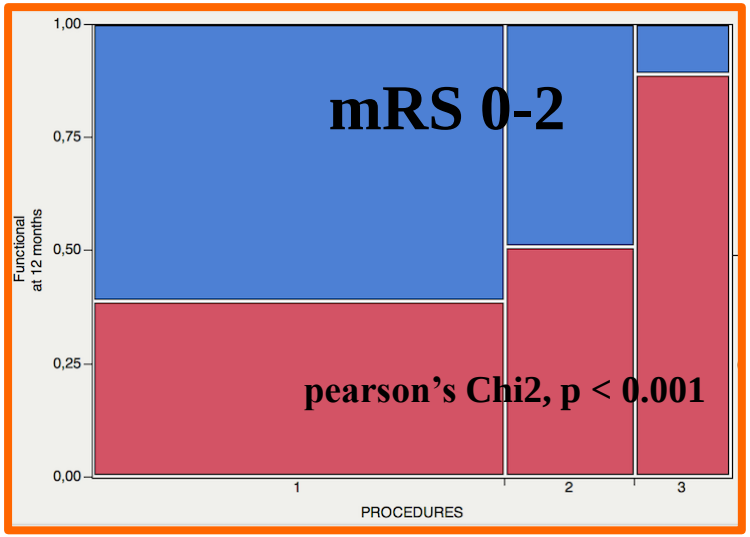


Table 4. At discharge, causes of morbidity and mortality (mRS > 2) of 237 elderly patients (≥ 70 years).

Causes	Endovascular n = 228 (%) *{Death}*	Microsurgical n = 74 (%) *{Death}*	Conservative n = 48 (%) *{Death}*	TOTAL n = 351 (%) *{Death}*
SAH	44 (19.3) *{3}*	10 (13.5)	18 (37.5) *{7}*	72 (20.5) *{10}*
Procedural events				
Hemorr.	1 (0.4)			3 (0.9)
Ischemia	10 (4.4) / *{3}*	9 (12.7) *{3}*		19 (5.4) *{6}*
Post-procedural Rebleeding	4 (1.8) / *{3}*	2 (2.7) *{2}*	12 (25) *{12}*	18 (5.1) *{17}*
Non-procedural Ischemia	39 (17.1) / *{7}*	16 (21.6) *{4}*	5 (10.4) *{4}*	60 (17.1) *{15}*
Hydrocephalus	30 (13.2)	7 (9.5)	3 (6.3)	40 (11.4)
Infectious				
Lung	13 (5.7) / *{13}*	1 (1.3)	5 (10.4) *{5}*	19 (5.4) *{18}*
Ventriculitis	1 (0.4) / *{1}*			1 (0.3) *{1}*
Others	2 (0.8)			2 (0.6)
Hyponatremia	1 (0.4)		1 (2.1)	2 (0.6)
Cardiopathy	1 (0.4) / *{1}*		1 (2.1) *{1}*	2 (0.6) *{2}*
TOTAL	147 (64.5) *{31}*	46 (62.2) *{9}*	44 (91.7) *{29}*	237 (67.7) *{69}*

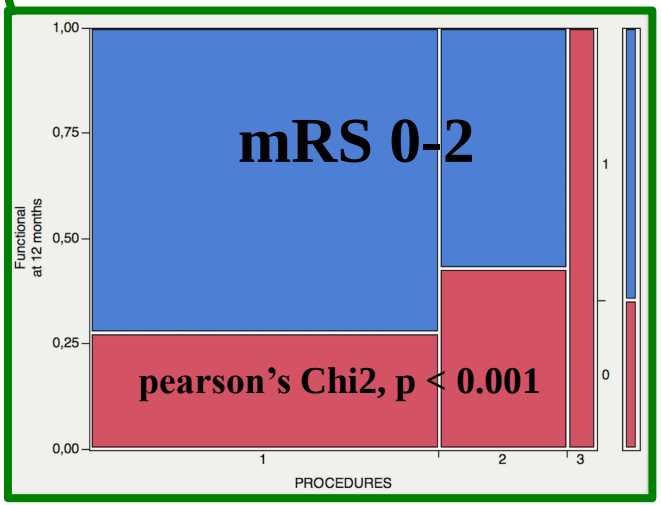
Fisher's exact test, p = 0.025

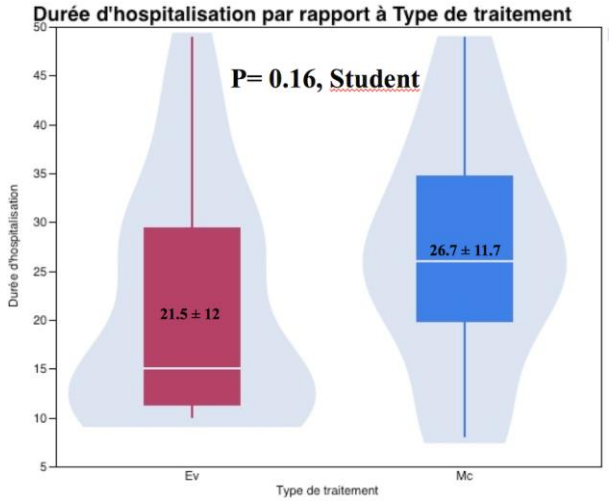
Table 5. At 12 months, functional outcome according to the therapeutic proposition in elderly patients (≥ 70 years) with aneurysmal SAH.

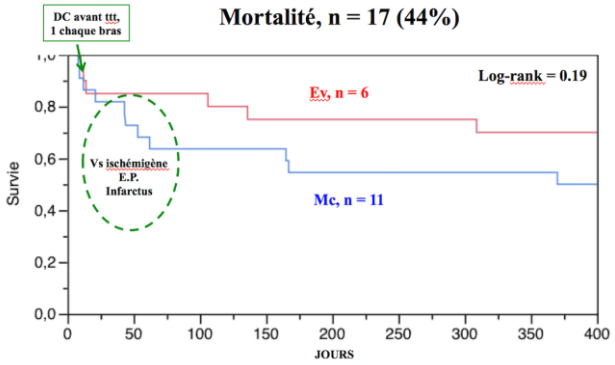
Functional outcome	Endovascular (n = 228) n Score ± SD [95%IC]	Microsurgical (n = 75) n Score ± SD [95%IC]	Conservative (n = 48) n Score ± SD [95%IC]	TOTAL (n = 351) n Score ± SD [95%IC]	p
MMSE / 30	n = 125 24.9 ± 0.6 [23.7-26.1]	n = 35 24 ± 1.1 [21.8-26.3]	n = 9 21.6 ± 2.3 [17.1-26]	n = 169 24.6 ± 0.5 [23.5-25.6]	0.21
ADLI / 6	n = 138 5.4 ± 0.1 [5.23-5.67]	n = 42 4.9 ± 0.3 [4.33-5.50]	n = 12 4.2 ± 0.6 [2.73-5.68]	n = 192 5.3 ± 0.1 [5.03-5.48]	0.05
IADL / 6	n = 137 4.9 ± 0.1 [4.6-5.23]	n = 41 4.4 ± 0.3 [3.89-4.96]	n = 12 3.4 ± 0.5 [2.35-4.48]	n = 190 4.7 ± 0.1 [4.46-5]	0.01
QOL (VAS / 7)	n = 124 5.4 ± 0.1 [5.13-5.68]	n = 39 4.8 ± 0.3 [4.3-5.29]	n = 9 4.6 ± 0.5 [3.52-5.58]	n = 172 5.2 ± 0.1 [4.98-5.46]	0.02

Table 6. Predictive factors to functional independence at 1-year (mRS 0-2) for 351 elderly patients (≥ 70 years old) with ruptured IA.

Variables	OR [95% IC]	p	aOR [95% IC]	p
Age ≤ 74 years-old	2.34 [1.45-3.78]	0.0005	2.34 [1.35-4.01]	0.002
WFNS I-II	5.23 [2.93-9.33]	< 0.0001	4.03 [2.15-7.80]	< 0.0001
Charlson ≤ 4	2.13 [1.26-3.62]	0.004	2.06 [1.14-3.79]	0.016
Fisher 1-2	3.72 [2.20-6.31]	< 0.0001	2.21 [1.21-4.08]	0.008
ACA vs. others	0.89 [0.57-1.40]	0.63		
Diameter ≤ 6 mm	1.65 [1.04-2.62]	0.03	1.70 [1.0-2.91]	0.048
Curative vs. conservative	3.17 [1.94-5.17]	< 0.0001	2.98 [1.73-5.22]	< 0.0001
Inclusion delay ≤ D1	1.03 [0.62-1.69]	0.90		
Operative time ≤ 120'	1.31 [0.77-2.23]	0.30		







Variables	Endovascular n = 20 [95% CI]	Microsurgical n = 21 [95% CI]	p
Age	75.7 ± 1.1 [73.4-77.9]	78.4 ± 1.1 [76.2-80.6]	0.09 †
Sex ratio F/H	4 (16/4)	2.5 (15/6)	0.52 §
Educational level			0.04 §
Primary school	9 (45)	8 (38.1)	
Secondary school	1 (5)	5 (38.1)	
Training	6 (30)	8 (23.8)	
University	3 (15)	0	
NA	1 (5)	0	
Carlson score (comorbidity)	3.7 ± 0.3 [3.2-4.3]	3.8 ± 0.3 [3.3-4.4]	0.95 §
WFNS classification			0.33 §
WFNS 1 (GCS 15)	10 (50)	8 (38.1)	
WFNS 2 (GCS 13-14)	4 (20)	7 (33.3)	
WFNS 3 (deficit)	0 (0)	2 (9.5)	
WFNS 4 (GCS 7-12)	6 (30)	4 (19.1)	
SAH on CT scan			0.43 §
Fisher 0	0 (0)	0 (0)	
Fisher 1	0 (0)	0 (0)	
Fisher 2	4 (20)	4 (19.1)	
Fisher 3	10 (50)	14 (66.7)	
Fisher 4	6 (30)	3 (14.3)	
Ruptured IA location			0.12 §
ACA	14 (50.8)	8 (38.1)	
MCA	3 (10.5)	7 (33.3)	
ICA	3 (28.1)	6 (28.6)	
Ruptured IA size			
Diameter	6.2 ± 0.6 [4.9-7.4]	6.1 ± 0.6 [4.9-7.3]	0.47 §
At 1 year			§
mRS 0-2	11 (57.9)	8 (42.1)	0.21
MMSE (13/10)	24.6 ± 1.9 [20.6-28.6]	25.5 ± 2.2 [20.9-30]	0.61
ADLI (13/10)	5.3 ± 0.4 [4.4-6.2]	5.5 ± 0.4 [4.5-6.5]	0.60
IADL (13/10)	5 ± 0.5 [3.9-6.1]	5.3 ± 0.6 [3.9-6.6]	0.62
QOL (13/10)	5.4 ± 0.5 [4.4-6.4]	4.3 ± 0.5 [3.1-5.5]	0.07

Commentaires

- **Limites**
  - **Randomisation faible,**
  - **Biais de procédure: hétérogène d'HSA**
- **Avantages**
  - **Puissance d'évaluation (large échantillon)**
  - **Peu de biais de recueils (CRCI)**
  - **Sous-groupe randomisé (unique)**
  - **Evaluation à long terme**
  - **Cognitif et autonomie**

Commentaires

- **Traitement conservateur : 10.8% mRS 0-2**
- **WFNS 1-4 => 50-60% mRS 0-2 à 1 an**
- **Ev et Mc : risque ischémie procédurale (Mc), cependant**
  - **Fonctionnel similaire**
  - **Cognitif et autonomie identiques**
  - **Qualité de vie, en faveur de Ev**

En résumé

- **Traitement Ev 1ère intention,**
- **Traitement Mc reste une procédure de qualité,**
- **9éme décennie, Ev, aléatoire Mc …**
- **La décision doit être « autre chose qu'un challenge technique… »**