Elderly Age Associated With Poor Functional Outcome After Rupture of Anterior Communicating Artery Aneurysms

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Learning Objectives

To determine the effect of old age on patient outcomes after rupture of anterior communicating artery aneurysms

Introduction

Increasing age is known to be a risk factor for poor functional outcome after aneurysmal subarachnoid hemorrhage (1). The effect of age on patient outcomes specifically after rupture of anterior communicating artery (Acom) aneurysms is less well-defined.

Methods

We performed retrospective cohort study on patients presenting to our institution with aneurysmal subarachnoid hemorrhage (aSAH) secondary to a ruptured Acom aneurysm between the years of 2003 and 2012. Patients were divided into two groups on the basis of age, with patients 65 years and older categorized as the elderly group. The effect of age on patient outcomes was then evaluated using multivariate logistic regression analysis.

Results

There were 147 patients that presented to our institution with a ruptured Acom aneurysm. Of these patients, 41 (27.9%) were 65 years or older. Patients in the elderly group were more likely to be female (68.3% vs 40.6%, p = 0.0026), and less likely to be active smokers (22.0% vs 60.4%, p = <0.0001) or to abuse alcohol (7.3% vs 21.7%, p = 0.0404). Elderly patients were more likely to have a history of hypertension (70.7% vs 52.8%, p = 0.0487) and coronary artery disease (19.5% vs 2.8%, p = 0.0006). Elderly patients were more likely to require a ventriculostomy (61.0% vs 37.7%, p = 0.0109) and ultimately to require permanent CSF diversion (36.6% vs 17.0%, p = 0.0106). On adjusted analysis, age greater than 65 was associated with a greater likelihood of poor outcome at last follow-up within one year of aSAH (OR 3.76, 95% CI 1.30-11.78, p = 0.0144).

Table 1

TABLE 1. Patient characteristics and clinical outcomes by age ≥65

Variable	Age <65 (n=106)	Age ≥65 (n=41)	Total (n=147)	P-value
Age, Mean (SD)	50.6 (8.2)	73.7 (5.9)	57.0 (12.9)	–
Range	(27-64)	(66-89)	(27-89)	
Gender, N (%)				
Male	63 (59.4)	13 (31.7)	76 (51.7)	
Female	43 (40.6)	28 (68.3)	71 (48.3)	0.0026
Smoking History				
No	32 (30.2)	25 (61.0)	57 (38.8)	
Yes	74 (69.8)	16 (39.0)	90 (61.2)	0.0006
Current Smoker				
No	42 (39.6)	32 (78.0)	74 (50.3)	
Yes	64 (60.4)	9 (22.0)	73 (49.7)	<0.0001
Family History of SAH				
No	99 (93.4)	37 (90.2)	136 (92.5)	
Yes	7 (6.6)	4 (9.8)	11 (7.5)	0.5148
Hypertension				
No	50 (47.2)	12 (29.3)	62 (42.2)	
Yes	56 (52.8)	29 (70.7)	85 (57.8)	0.0487
Diabetes				
No	97 (91.5)	37 (90.2)	134 (91.2)	
Yes	9 (8.5)	4 (9.8)	13 (8.8)	0.8085
Coronary Artery Disease				
No	103 (97.2)	33 (80.5)	136 (92.5)	
Yes	3 (2.8)	8 (19.5)	11 (7.5)	0.0006
Alcohol Abuse				
No	83 (78.3)	38 (92.7)	121 (82.3)	
Yes	23 (21.7)	3 (7.3)	26 (17.7)	0.0404
WFNS Score				
1 – 3	75 (70.8)	25 (61.0)	100 (68.0)	
4 – 5	31 (29.2)	16 (39.0)	47 (32.0)	0.2542
Modified Fisher Score				
1 – 2	24 (22.6)	9 (22.0)	33 (22.5)	
3 – 4	82 (77.4)	32 (78.0)	114 (77.5)	0.9283
Intracerebral Hemorrhage				
No	83 (78.3)	32 (78.1)	115 (78.2)	
Yes	23 (21.7)	9 (21.9)	32 (21.8)	0.9734
Intraventricular Hemorrhage				
No	63 (59.4)	18 (43.9)	81 (55.1)	
Yes	43 (40.6)	23 (56.1)	66 (44.9)	0.0895
Aneurysm Size (mm)	6.6 (3.5)	5.5 (3.6)	6.3 (3.6)	0.0879
External Ventricular Drainage				
No	66 (62.3)	16 (39.0)	82 (55.8)	
Yes	40 (37.7)	25 (61.0)	65 (44.2)	0.0109
Treatment Modality				
Medical	7 (6.6)	4 (9.8)	11 (7.5)	
Coiling	65 (61.3)	30 (73.2)	95 (64.6)	
Clipping	34 (32.1)	7 (17.1)	41 (27.9)	0.1808
Angiographic Vasospasm				
No	47 (54.7)	24 (80.0)	71 (61.2)	
Yes	39 (45.3)	6 (20.0)	45 (38.8)	0.0142

TABLE 1 (cont'd). Patient characteristics and clinical outcomes by age ≥65

Variable	Age <65 (n=106)	Age ≥65 (n=41)	Total (n=147)	P-value
Symptomatic Vasospasm				
No	56 (65.1)	23 (76.7)	79 (68.1)	
Yes	30 (34.9)	7 (23.3)	37 (31.9)	0.2425
Delayed Cerebral Ischemia				
No	68 (64.8)	31 (77.5)	99 (68.3)	
Yes	37 (35.2)	9 (22.5)	46 (31.7)	0.1407
Infarction				
No	68 (64.2)	28 (68.3)	96 (65.3)	
Yes	38 (35.8)	13 (31.7)	51 (34.7)	0.6361
Shunt Requirement				
No	88 (83.0)	26 (63.4)	114 (77.6)	
Yes	18 (17.0)	15 (36.6)	33 (22.5)	0.0106
Modified Rankin Scale				
0 – 2	84 (79.3)	24 (58.5)	108 (73.5)	
3 – 6	22 (20.8)	17 (41.5)	39 (26.5)	0.0108

Table 2

TABLE 2. Univariate logistic regression analysis indicating likelihood of treatment with endovascular coiling

Variable	OR (95% CI)	P-Value
Age ≥65	2.24 (0.93-6.02)	0.0724

Univariate logistic regression analysis indicating likelihood of treatment with endovascular coiling

Table 3

TABLE 3. Univariate logistic regression analysis indicating likelihood of poor functional outcome (mRS >2)

Variable	OR (95% CI)	P-Value
Age >65	2.70 (1.24-5.92)	0.0129
Gender		
Male	0.85 (0.41-1.77)	0.6637
Female	1.18 (0.56-2.46)	0.6637
Smoking History	1.02 (0.48-2.19)	0.9626
Current Smoker	1.09 (0.52-2.28)	0.8131
Family History of SAH	1.04 (0.22-3.83)	0.9539
Hypertension	0.92 (0.44-1.95)	0.8350
Diabetes Mellitus	1.04 (0.22-3.66)	0.9544
Coronary Artery Disease	1.33 (0.28-4.91)	0.6964
Alcohol Abuse	1.02 (0.37-2.58)	0.9602
WFNS 4 – 5	8.29 (3.73-19.34)	<0.0001
Modified Fisher 3 – 4	7.45 (2.10-47.52)	0.0008
Intracerebral Hemorrhage	3.35 (1.46-7.70)	0.0046
Intraventricular Hemorrhage	6.67 (2.96-16.36)	<0.0001
Aneurysm Size	1.11 (1.00-1.24)*	0.0506
External Ventricular Drainage	2.26 (1.08-4.83)	0.0307
Treatment Modality		
Coiling	0.57 (0.19-1.45)	0.2475
Clipping	1.76 (0.69-5.12)	0.2475
Angiographic Vasospasm	1.56 (0.59-4.07)	0.3630
Symptomatic Vasospasm	3.73 (1.42-10.20)	0.0079
Delayed Cerebral Ischemia	2.71 (1.24-5.91)	0.0120
Infarction	3.03 (1.43-6.54)	0.0039
Shunt Requirement	1.27 (0.53-2.94)	0.5810

Abbreviations: SAH = subarachnoid hemorrhage
* Unit Odds Ratio, indicating the increase in OR for every 1 mm increase in aneurysm size

Univariate logistic regression analysis indicating likelihood of poor functional outcome (mRS >2)

Table 4

TABLE 4. Multivariable analysis showing independent associations with poor functional outcome (mRS >2)

Variable	OR (95% CI)	P-Value
WFNS 4 – 5	6.43 (2.50-17.7)	<0.0001
Intraventricular Hemorrhage	4.56 (1.69-13.38)	0.0024
Age ≥ 65	3.76 (1.30-11.78)	0.0144

Multivariable analysis showing independent associations with poor functional outcome (mRS >2)