

Introduction

The etiology of intracranial aneurysms remains to be identified. Potential risk factors associated with multiple aneurysms may shed light on the possible cause of aneurysm formation in the first place. (1) In this study, investigators compared patients who underwent microsurgical clipping to see what factors are associated with patients having multiple aneurysms pre-operatively discovered on imaging.

Methods

Solitary aneurysms microsurgically treated by the senior author (M.T.L.) were included from a database of patients treated between January 2010 to April 2013 at a tertiary academic medical center. Patient age, sex, history for hypertension, tobacco use, alcohol use, aneurysm location (anterior vs. posterior), subarachnoid hemorrhage at presentation, aneurysms size, and post-operative neurologic status were collected. Neurologic status was assessed using the modified Rankin Scale (mRS). Neurologic outcomes were dichotomized, categorizing mRS scores 0-2 as ‘good’ and 3-6 as ‘poor’ and aneurysm size into small (<10 mm) or large (= 10 mm).

Results

A total 353 patients were included; 74.8% were female. Patients with multiple aneurysms present comprised 16.7% (59/353) of the population. We found no difference in patients with multiple aneurysms between gender type (p-value=.20), age (p-value=.26), patients = 50 (p-value=.67), history of hypertension (p-value=.12), tobacco use (p-value=.68), alcohol use (p-value=.13), location (p-value=.28), SAH at presentation (p-value=.87), and outcomes (p-value=.45).

Patients with large aneurysms did have a greater occurrence of multiple aneurysms (29%, 20/69) than patients with small aneurysms (15.4%, 38/246) (RR 1.88 p-value=.01; 95% CI 1.17 – 3). Using multivariate logistic regression, including age, gender, hypertension, tobacco history, alcohol use, SAH at presentation, location, and size, only size was significant (OR 2.38, p-value=.02; 95% CI 1.16 – 4.85).

Table 1	
Patient Summary	Number (%)
Number of Patients	353
Mean Age (years)	57.1
Age Range	5 - 89
Sex (Females)	264 (74.8)
HTN	200 (57.3)
Diabetes	37 (10.6)
Tobacco Use	154 (45.7)
Presented with a Subarachnoid Hemorrhage	159 (45.0)
Hunt and Hess Grade	
0	191 (54.7)
I	7 (2)
II	71 (20.3)
III	33 (9.5)
IV	25 (7.2)
V	22 (6.3)
Mean Aneurysm Size (mm)	7.5
Range (mm)	1.2 - 60
Large Aneurysm (>10 mm)	69 (20.7)
Location	
MCA	76 (22)
ACoM	78 (22.6)
PCoM	52 (15.1)
Basilar	24 (7)
Posterior Inferior Cerebellar Artery	15 (4.4)
Supracclinoid Internal Carotid Artery	27
Ophthalmic	21 (6.1)
Other	52 (15.1)
Posterior Circulation	56 (16.2)

Patient Summary

Table 2				
Patient and Aneurysm Characteristics	Single Aneurysm (n=294)	Multiple Group (n=59)	p-value	
			t-test	Chi2
Mean Age (years)	56.7	59.2	0.26	
Gender (Female)	216 (73.5)	48 (81.4)		0.20
Hypertension	162 (55.5)	38 (66.7)		0.12
Diabetes	30 (10.2)	3 (12.7)		Fisher 0.63
Alcohol Use	120 (42.4)	18 (31.6)		0.13
Tobacco Use	127 (45.2)	27 (48.2)		0.68
Subarachnoid Hemorrhage	133 (45.2)	26 (44.1)		0.87
Large Aneurysm (>10 mm)	49 (19.1)	20 (34.5)		0.01
Posterior Circulation	44 (15.3)	12 (21.1)		0.28
Poor Neurologic Status Pre-Operatively	58 (19.7)	39 (33.9)		0.02
Poor Neurologic Status at Discharge	57 (19.4)	45 (23.7)		0.45
Mortality	9 (3.1)	5 (8.5)		.05

Comparison of Patient and Aneurysm Characteristics between Single and Multiple Aneurysm Patient Groups

Table 3						
Patient and Aneurysm Characteristics	Univariate Regression			Multivariate Regression		
	Odds Ratio	95% CI	p-value	Odds Ratio	95% CI	p-value
Age (years)	1.01	.99 - 1.03	0.26	1	.98 - 1.02	0.97
Gender (Male)	0.63	.31 - 1.28	0.21	0.66	.30 - 1.46	0.3
Hypertension	1.61	.88 - 2.92	0.12	1.3	.59 - 2.7	0.55
Alcohol Use	0.63	.34 - 1.15	0.13	0.61	.30 - 1.2	0.17
Tobacco Use	1.12	.64 - 2.01	0.68	1.32	.67 - 2.57	0.42
Subarachnoid Hemorrhage	0.95	.54 - 1.67	0.87	0.53	.23 - 1.23	0.14
Large Aneurysm (>10 mm)	2.23	1.20 - 4.17	0.012	2.4	1.16 - 4.96	0.02
Posterior Circulation	1.48	.72 - 3.02	0.28	0.79	.31 - 1.98	0.62
Poor Neurologic Status Pre-Operatively	2.08	1.13 - 3.84	0.02	3.97	1.60 - 9.86	0.003
Univariate and Multivariate Regression Analysis for Characteristics Associated with Patient’s Having Multiple Aneurysms.						

Conclusions

Large aneurysms were found to be a risk factor for patients having multiple aneurysms who underwent microsurgical treatment; almost a third had multiple aneurysms present. Patient age, gender, history of hypertension, diabetes, tobacco use, tobacco pack-year history, aneurysm location, SAH presentation, and outcomes were not found to be significant risk factors.

Learning Objectives

By the conclusion of this session, participants should be able to 1) identify risk factors associated with patients having multiple aneurysms.

References

1.Juvela S. Risk factors for multiple intracranial aneurysms. Stroke. 2000;31(2):392-7.