Does the Size Ratio Indicate a Ruptured Intracranial Aneurysm?

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Introduction

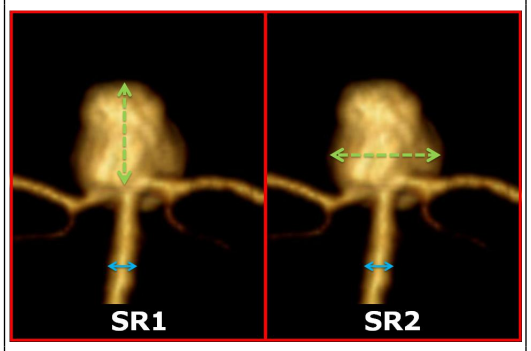
Predicting the likelihood of intracranial aneurysm rupture remains a challenge when considering treatment for asymptomatic patients with incidental, unruptured aneurysms. The advancement in medical imaging has allowed investigators to correlate rupture status with several morphological properties that may have clinical implications in determining an aneurysm's tendency to rupture. Recently, the size ratio parameter was shown to indicate rupture status.

Objective: To compare the size ratio (SR) parameter between ruptured and unruptured aneurysms and evaluate results with findings from previous studies.

Methods

A population sample of 114 consecutive patients with 61 ruptured and 74 unruptured aneurysms at our institution underwent retrospective analysis. Using two methods, both the maximum height and width of the aneurysm were divided by the parent vessel (PV) diameter to calculate SR. Two dimensional (2D) CT angiography was primarily used to obtain measurements, although 2D angiograms and 3D CT/MR images were occasionally substituted. A two-tailed Mann-Whitney Test was used to assess the statistical significance of difference between the SRs of ruptured and unruptured aneurysms. Univariate logistic regression was used to evaluate SR as a potential risk factor for rupture outcome.

SR Measurements



SR was measured in two ways: SR1 = max height/parent vessel diameter, SR2 = max width/parent vessel diameter

Results

The difference between the average SR1s related to maximum height for ruptured group (2.80 +- 1.43; mean age = 57 +- 13) and unruptured group (2.30 +- 1.52; mean age = 56 +- 12) were significantly different (P = 0.018). Univariate logistic regression with stepwise selection revealed the limited predictive value (P = 0.0547) of SR1 for rupture outcome (OR, 1.27; 95% CI, 1.00 to 1.61).

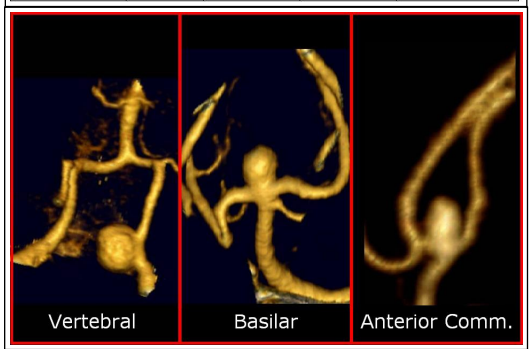
Conclusions

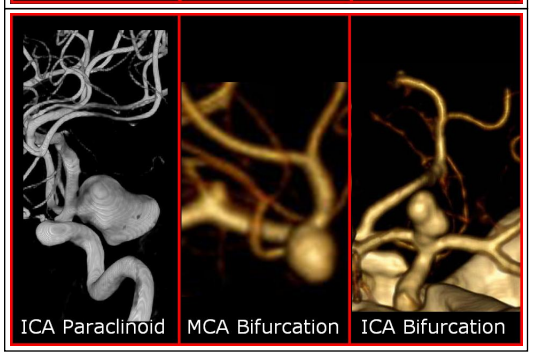
The SR morphological parameter related to the maximum height of intracranial aneurysms is a weak indicator of rupture status in retrospective analysis. Further studies are needed to determine the clinical significance of SR in a prospective cohort.

Comparing means of SR1 and SR2 for ruptured and unruptured sample populations

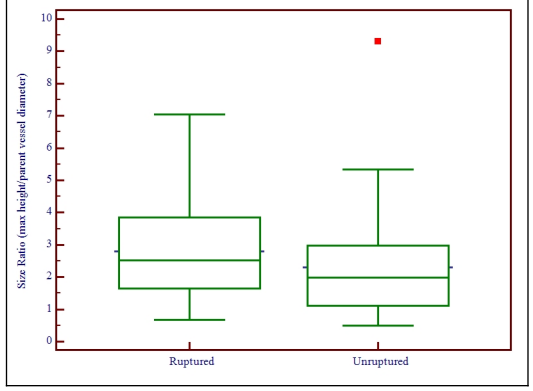
Circulation Location		SR1	SR2	N	M/F
Anterior/Posterior	*Ruptured*	2.80 +- 1.43	2.51 +- 1.31	61	14/47
	Unruptured	2.30+- 1.52	2.23 +- 1.39	74	17/57
	P-value	0.018	0.119		
Anterior	*Ruptured*	2.76 +- 1.42	2.49 +- 1.30	52	13/39
	Unruptured	2.28 +- 1.53	2.23 +- 1.40	64	16/48
	P-value	0.029	0.164		
Posterior	*Ruptured*	3.07 +- 1.57	2.59 +- 1.49	9	1/8
	Unruptured	2.38 +- 1.53	2.23 +- 1.48	10	1/9
	P-value	0.315	0.356		

Gender		SR1	SR2	N
Male	*Ruptured*	2.83 +- 1.49	2.20 +- 1.08	14
	Unruptured	2.78 +- 1.61	2.56 +- 1.55	17
	P-value	0.984	0.475	
Female	*Ruptured*	2.80 +- 1.43	2.60 +- 1.37	47
	Unruptured	2.15 +- 1.47	2.13 +- 1.34	57
	P-value	0.012	0.044	





SR1 Distribution



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